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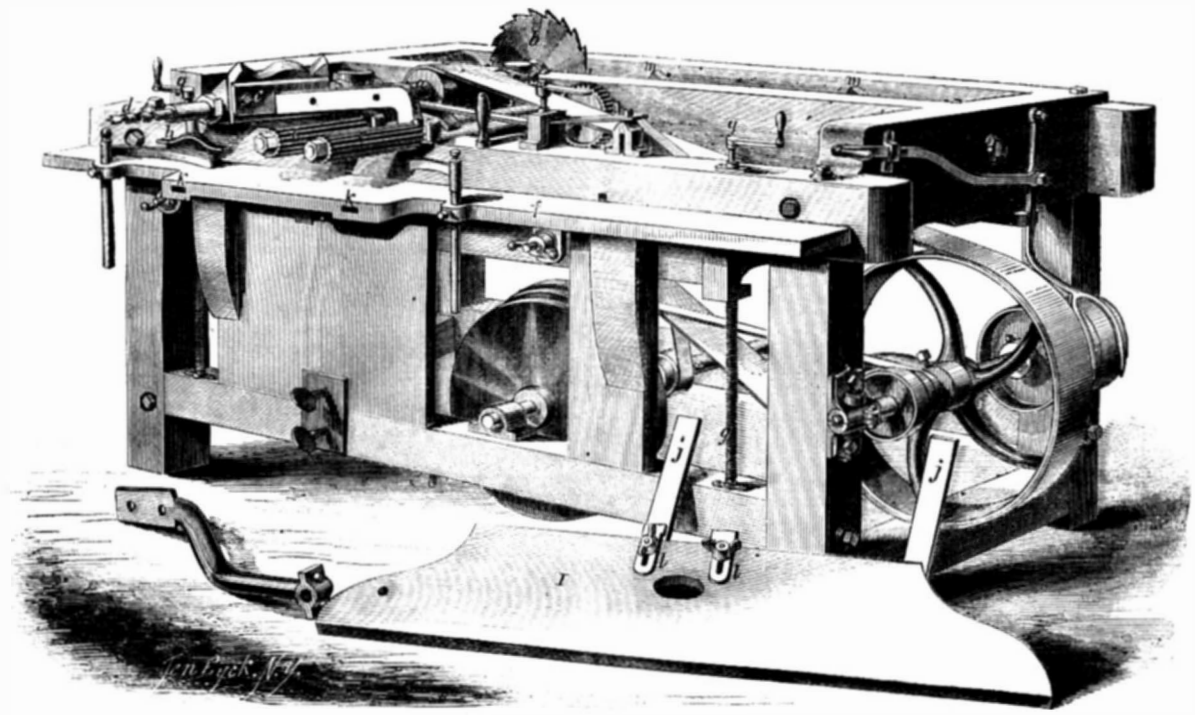
Combined Sawing, Boring, Molding and Planing Machine.

The annexed engraving represents a machine designed by a practical mechanic for doing a great variety of work in cutting and boring wood, and which on trial is found to be a very convenient and useful article in machine shops and other wood-working establishments. It is a very simple combination of a circular saw with a rotary cutter and boring tool, all of these being placed on a single shaft or mandrel.

The shaft, *a*, carries near one end the circular saw, *b*, and near the other the cutter head, *c*; the hole for screw in the end of the machine not shown in the cut.

The mode in which motion is imparted by belts to the several parts will be readily understood from an inspection of the cut.

The patent for this invention was granted July 29, 1862, and further information in relation to it may be obtained by addressing the inventor, John H. Post, at Paterson, N. J.



POST'S COMBINED SAWING, BORING, MOLDING AND PLANING MACHINE.

the shank of the boring tools being in the extreme end, *d*. The fluted rollers, *e e*, feed the stuff along as it is being planed or molded by the cutters in the head, *c*; the stuff resting upon the table, *f*, the hight of which may be adjusted to the thickness of the stuff by means of the screws, *g g*, which are provided with cranks at their upper ends for turning them. The feed rollers are held down at their journals by a cap and spring, and a spring, *h*, holds the stuff down as it passes from under the rollers.

The table, I, for supporting the stuff while it is being bored is represented as detached from the machine and lying upon the ground. This table is supported in the machine by the arms, *j j*, which enter the slots, *k k*, and are held in place by set screws, so that the position of the table may be adjusted to regulate the depth of the holes. Further provision is made for regulating the depth of the holes by the adjustable stops, *l l*.

The machine is represented with the table on which the stuff rests while being sawed, removed to show the mode of adjusting the hight of this table. The inclined planes, *m m*, are secured firmly to the frame of the machine, and similar inclined planes fitting these are secured to the lower side of the table, so that by moving the table lengthwise its hight is varied. This longitudinal motion is imparted by a

Report on Testing Iron Armor Plates.

A commission was appointed by the British Government to make experiments with iron plates and targets in order to ascertain the best mode of constructing armor-clad war vessels. The *Army and Navy Gazette* commenting on the subject says :—

The commissioners, in judging for themselves after a series of experiments, have, we are told, come to the conclusions—First, that the material best suited for armor plates is wrought iron of the softest quality ; and that it need not be of the highest price, for hammering or rolling, or both, will produce all that is needed. The commissioners, therefore, are led to recommend the erection by Government of machinery for the manufacture of their own plates. Captain Dahlgren may be pleased to learn that the commissioners do not think the measure of the absolute destructive power of the shot is its momentum, but the work—*vis viva*—accumulated in it which varies directly as the weight of the shot multiplied into the square of the velocity at impact. The American plan of bolting thin plates together, adopted in ignorance of statical laws, is altogether condemned. The commissioners, we hear, also arrive at conclusions unfavorable to angulated sides, in so far as this, that they consider iron is more usefully disposed in vertical plates of a given thickness than the same weight would be if disposed in thinner plates placed obliquely to cover the same vertical area. As the junctures are weak the largest sized smooth-faced plates are recommended. Backings of wood or fantastic clastics are of no avail, but backings of cast iron or granite are well spoken of, and a facing of four inches of elm was found to save the plate considerably. Mr. Grantham's proposal to sheath the bottoms of iron ships is approved of. There seems, however, to be a conviction that a ship of 5,000 tuns burthen is the smallest size to which armor can be applied with advantage. The most satisfactory results were obtained from iron plates exceeding 2 inches and less than 3½ inches in thickness, as a facing to brickwork, although the commissioners reserve their opinion on the whole question for the present. The *Warrior* target received a tremendous hammering from 3,229 pound of shot fired from 68-pounders, 100-pounders, 200-pounders and one 140-pounder, and though the tongueing and grooving are objectionable, it has sustained a greater amount of firing with less injury than any other construction, and proved far superior to Mr. Roberts's target. "Two 68-pounders cracked the plate and broke two bolts; three 100-pounders, fired in salvo, broke a hole 18 inches by 9 inches, and cracked the plate across." Mr. Fairbairn's targets were utter failures. The experiments so far do not authorise the commissioners to recommend the abandonment of wood backing. On the whole, the amount of facts collected in the report, we understand, is enormous, and the commissioners deserve great credit for their patience and perseverance. It would be well if the members abstained, whilst serving on the commission, from putting forward their own targets, at least till they have inquired into all the plans which may be submitted to them.

RASPBERRY bushes should now be looked to and the bearing wood of the present year cut out to give the new shoots a good growth for the next year's crop; in this way they will attain a much stronger and more vigorous growth.

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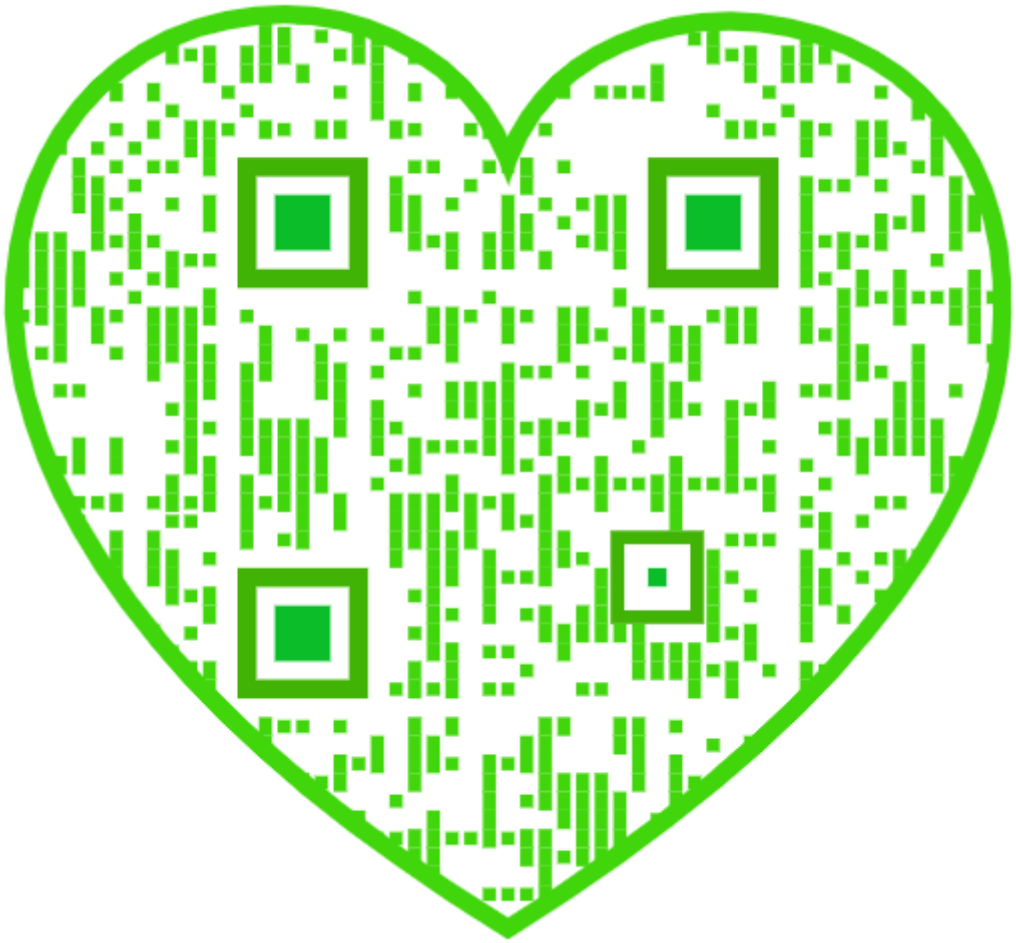

NOTES ON NAVAL AND MILITARY AFFAIRS.

A GENERAL ADVANCE OF THE REBELS.

We have had intimations for some time that the rebels, encouraged by their wonderful series of successes, had determined upon an invasion of the North along the whole border line, from Washington to Missouri, and the plan is now being executed with surprising audacity.

INVASION OF KENTUCKY.

On Saturday, Aug. 30th, the same day on which the great battle took place in Virginia, General Kirby Smith with some 16,000 rebel soldiers, appeared before Richmond, a small town in the center of the east half of Kentucky about 90 miles in a straight line nearly due south from Cincinnati. At this point there were about 7,000 Union troops—raw levies from Indiana and Ohio—under General Nelson. A battle took place which resulted in the complete rout of the Union forces, with a loss of some 200 killed and 2,400 prisoners.

EXCITEMENT IN CINCINNATI.

The intelligence of this defeat produced the most intense excitement in Cincinnati, as it was feared that General Kirby Smith would advance and attack that opulent city. The citizens were accordingly called on by the Mayor to enroll themselves *en masse* for the defence of the place, and they responded with the greatest enthusiasm. All classes and nationalities laid aside their jealousies and devoted themselves to the salvation of their city. All able bodied negroes were impressed to labor on the fortifications under the direction of a competent United States engineer, and soon 25,000 men were engaged every afternoon in military drill.

FURTHER MOVEMENTS OF KIRBY SMITH.

From Richmond General Smith advanced to Lexington, recruiting his forces on the way from the Secession element in Kentucky, and overpowering the little detachments of Union troops who were guarding the road. From Lexington a railroad leads north to Cincinnati 99 miles, and another north-west to Louisville 94 miles. Both of these commercial cities, situated on the Ohio river, are places of great wealth, and either would prove a rich prize to a rebel army could they succeed in capturing it.

GENERAL BRAGG'S MOVEMENTS.

This movement of Kirby Smith's is especially audacious, considering that General Buell with a powerful army is 200 miles south of Lexington in the southern part of Tennessee. But the enemy's programme embraced a plan for keeping General Buell occupied. General Bragg who was commanding a rebel force at Chatanooga, stated at some 40,000 strong, started at the same time toward Buell's army which was a few miles at the west. General Bragg adopted the same plan that has been so successful with the rebel leaders, that of falling on the communications of the Union General, and forcing him to fall back. This led to a concentration of Buell's army, during which there was a week of marching and countermarching in the mountains. At the last accounts the two armies were facing each other, General Bragg being very near the middle of Tennessee, and General Buell at the southwest of him. General Buell does not seem to have been so completely outgeneraled as most of our commanders have been.

THE REBELS IN OHIO.

On Wednesday, September 2, a small band of guerrillas crossed the Ohio river near Racine, and proceeding to that town; they killed one man and wounded two others, and stole twelve horses. They then recrossed the river at Wolf's Bar and encamped for the night.

INVASION OF MARYLAND.

On Monday September 1st, the day of the last fighting by General Pope's army, Captain Cole, with 150 of the First Maryland cavalry, was engaged reconnoitering the country in the neighborhood of Leesburg, when he suddenly came upon a column of rebel horsemen, under Fitz Hugh Lee, estimated at 2,000 men.

Leesburg is in Virginia, about twenty-five miles northwest of Fairfax Court House, the scene of Pope's last battle, and is about four miles south of the Potomac river, which can be crossed in this vicinity at several fords. A skirmish ensued, in which Captain Cole's company got decidedly the worst of it, and only effected their escape across the river with a loss in killed, wounded and missing of nearly one-third of their number. Captain Cole, having received a reinforcement, pushed across the river once more, with the intention of avenging the loss he had sustained, when, to his astonishment, he discovered not only cavalry but infantry and artillery in large numbers, and he hastily fled with the information.

On Friday, September 5th, the rebels crossed the Potomac into Maryland in large force. The advanced guard amounting to about 8,000 men marched in the cool of the evening toward Frederick, a beautiful town of some 6,000 inhabitants, situated about 12 miles from the Potomac. It was after dark when they reached Buckeyestown, where they posted their pickets in all directions and bivouacked for the night. Meanwhile foraging parties were sent out in all directions, who drove in large quantities of beef cattle, negroes to slaughter and cook them, hogs, sheep, fowl, &c. They also brought in abundance of other provisions to their bivouac, not forgetting intoxicating liquors and salt wherever they were to be found, regardless of the prior claims of former possessors or anything else. The fence rails made the bivouac fires, and for the first time in a long while the secesh had evidently a jolly night of it. In pursuance of orders, Captain Faithful, the Provost Marshal at Frederick, removed about one third of the stores at Frederick; but before more could be sent forward it was found necessary to leave or else become prisoners of war. The balance of the stores were therefore, on the afternoon of Friday, committed to the flames, and Frederick was immediately afterward evacuated by our troops. The Junction was also evacuated, and all the stores tents, camp equipage, cannon, &c., at that point safely transferred to Monrovia Station—a point on the railroad about twenty-three miles from Baltimore, where they are now encamped, awaiting the further advance of the desperate enemy.

The next morning, Saturday Sept. 6th, before the break of day, the enemy having sent forward his scouts previously, and been informed that Frederick was evacuated, resumed his line of march toward the picturesque and hitherto prosperous and pleasant little city. Early in the morning the town was occupied by 8,000 of the rebels, and among the first to enter it were the First Maryland rebel regiment. Colonel Bradley Johnston, who commands this regiment, is a native of Frederick. He was the first rebel to enter the town. The secessionists in Frederick of course turned out in full strength to meet their friends, and the display of rebel rags was proportionately large.

Since this date the country has been filled with rumors of the movements of the rebels. It is said that their main army, amounting to 120,000 men, have crossed the Potomac, and that they intend to attack Baltimore and to march into Pennsylvania.

PREPARATIONS TO RECEIVE THEM.

General McClellan has left Washington at the head of troops, the force of which is not stated, and has proceeded up the Potomac toward the enemy. At last accounts he was at Rockville, 14 miles northwest from Washington, and the rebel army was supposed to be along the line of Seneca Creek, some 12 miles beyond. The Governor of Pennsylvania is making the most vigorous preparations to defend that State, and he is zealously seconded by all classes of citizens.

It is believed by many of our army officers that all of the rebel armies who have made these desperate advances into the North will be captured.

DEATH OF GEN KEARNEY.

In the battle fought between Centerville and Fair Fax Court House on Monday, Sept. 1st., of which we gave an account last week, the brave General Kearney was killed. He was a native of this city, and after joining the army he went to France and studied in one of the military schools. He also served in the French army in Africa. He was ranked by our soldiers among the fighting generals.

BRILLIANT ACTION UNDER COMMAND OF AN ORDERLY SERGEANT.

On Tuesday, the 2d inst., a battle occurred at Plymouth, in North Carolina, between three hundred Union soldiers and fourteen hundred rebels, under command of Col. Garrett. The rebels were composed of cavalry and infantry. They intended attacking Plymouth and burning it to the ground in consequence of the stern loyalty of its inhabitants. They came on Tuesday night within three miles of the town, intending to bivouac for the night and make the attack in the morning. This plan was frustrated through the energy of one of the loyal natives, who came quickly into town and reported the fact to Capt. W. H. Hammell, of Hawkins' Zouaves, who, with his own company and a company of loyal North Carolinians, occupy the town. Unfortunately, Capt. Hammell was sick, his first lieutenant was also sick, and his second lieutenant disabled by a wound received in a former engagement, so that the command of the little army devolved upon Orderly Sergeant Green. No time was to be lost, and in an hour the two companies, some of Captain Flusser's brave tars, and the greater portion of the male citizens of the town moved out to give fight to fourteen hundred rebels. After a short march they came upon the rebels, who were in the bushes. Sergeant Green commanded our little band in a manner which would reflect honor upon a general. The rebels were surprised. A fight of one hour's duration terminated in the rout of the rebels, the capture of the colonel who commanded the whole force, and Lieutenant Fagan, who commanded the cavalry. With these, forty other prisoners were captured, and about thirty of the cavalry horses. Thirty of the rebels were killed. Sergeant Green lost three in killed.

CHANGES IN COMMANDS.

General Pope has been relieved at his own request of the command of the army of Virginia, and appointed to the command of the North West. General McClellan now has command of the forces about Washington. General Banks is appointed under McClellan in command of the Washington fortifications. General Hunter has been superseded in the command of the department of the South by General Mitchel.

MISCELLANEOUS SUMMARY.

In the great glass manufactory of Clichy, France, and other places, oxide of zinc is being substituted for red lead. It possesses the advantages of being cheaper, purer and supporting a higher temperature, without blackening. It is, however, apt to assume a yellow color when the pots have been used for some time; but this is counteracted by the addition of a small quantity of oxide of nickel, about four to six drachms per 550 pounds of white zinc.

In the British House of Lords, lately, Lord Shaftesbury expressed his belief that "there is more cotton lying idle in India than would keep going all the mills in Lancashire." He added that, according to his information, the quantity of this precious article ready for market is about six million bales.

Nine out of every ten horsemen start in their seat whenever a horse shies, and then the horse is either by whip or spur driven up the to object. This makes horses look at any singular object with more nervousness, for they expect a thrashing at the same moment. The rider should neither shy himself, nor notice it in his horse; and far less punish him.

A number of hack coaches which were impressed by the Government to bring wounded from the battle fields in Virginia, are now standing on the fields, the rebels having carried off the horses.

By the latest news from Europe we learn that there were only 18,000 bales of American cotton in Liverpool, and the advance in price in one week had been six cents per pound.

Spain is waking from her long lethargy. She has commenced the construction of railroads, and the Government has just nominated a commission to organize an industrial exhibition.

Jefferson Davis has issued a proclamation for another day of fasting and prayer.

A Noble Inventor.—Elias Howe, Jr., the well known inventor of the sewing machine, has not only given thousands of dollars to the Union cause, but has joined the 17th Connecticut Regiment as a private, and with gun in hand and knapsack on his back is now serving his country in the defence of Baltimore.

Raymond's Jury Rudder.—The address of the inventor of this rudder is John C. Raymond, 122 Avenue D, New York.

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Stereoscopic Photographs of the Organs of Voice in Action.

The *Photographic News* says :—

The photographer has carried his art into the most inaccessible regions of the earth ; the glorious panoramas visible from the summits of Alpine peaks have been fixed and brought down for the admiration of the non-mountaineering section of the public ; his instrument has been lowered to the bottom of the sea, and brought up again with an impression of the kind of ground on which mermaids and sea serpents are supposed to exercise themselves ; the heavenly bodies floating in space, have by his art been made to draw their own likenesses ; the minute microcosms in a drop of water, and those elementary cells, hovering, as it were, between the confines of the animal and vegetable, have been self imprinted in all their magnified beauty, disclosing new secrets to the earnest student ; catacombs, grottoes, and caverns deep in the bowels of the earth have been illuminated by the electric light, and their hidden wonders fixed on the sensitive plate ; but all these achievements fall short of one which has recently come under our notice—obtaining photographs of the interior of a living human body. For some years past it has been known that instruments had been devised by which those organs concerned in the production of the voice could be rendered visible. Mr. Garcia was, we believe, the first who brought the glottis and its movements during speech under the cognizance of our eyesight, and in 1855, he exhibited, at the Royal Society, his instrument, and at the same time described some of the results he had obtained with it in reference to the mechanism of the voice. Only a very limited portion of the whole extent of the glottis could, in this manner, be brought into view, and the instrument remained very incomplete until recently, when it may be almost said to have been brought to perfection in the laryngoscope of Professor Czermak. By means of this instrument the whole glottis and the adjacent parts are clearly seen ; its condition during vocalization and the changes of the cords in the production of the different chest and falsetto notes, become patent to the eye ; and the ingenious contriver has actually succeeded in producing photographs, nay, even stereoscopic views of the phenomena. It is needless to enlarge on the physiological value of this visual test, applied to the various speculations on the voice. We may notice it here, as a conspicuous example of an unseen process in the human body which has remained hidden through all by-gone time, being in our own day brought fairly into light and fixed by the wonderful art of the photographer for the benefit of all future students in this branch of science.

Oil of Turpentine and Camphor.

Oil of turpentine, commonly called essence of turpentine, is a semi-liquid resinous substance which exudes from certain trees of the pine tribe, and is obtained by distilling the resin along with the water. This oil contains a little resin, from which it may be freed by re-distillation with water. It is colorless, very fluid and has a very peculiar smell. Its specific gravity at 60° is 0 872 ; that of the spirit on sale at the shops is 0 876. This oil always reddens litmus paper, because it contains a little succint acid.

100 parts of spirits of wine of specific gravity 0·84, dissolve only 13 1-4 of oil of turpentine at 72° Fah. When agitated with alcohol at 0 830, the oil retains afterward one-fifth of its bulk of the spirit ; hence this proposed method for purifying oil of turpentine is defective. The oil, if left during four months in contact with air, is capable of absorbing twenty times its bulk of oxygen gas. One volume of rectified oil of turpentine absorbs at the temperature of 72°, and under the common atmospheric pressure, 163 times its volume of muriatic acid gas, provided the vessel be kept cool with ice. This mixture being allowed to repose for twenty-four hours produces out of the oil from 26 to 47 per cent of a white crystalline substance which subsides to the bottom. It has been called artificial camphor from its resemblance in smell and appearance to this substance. After being washed first with water containing a little carbonate of soda, then with pure water, and finally purified by sublimation with some chalk, lime, ashes or charcoal, it appears as a white translucent, crystalline body, in the form of flexible, tenacious needles. It swims upon the surface of water, diffuses a faint smell of camphor, commonly mixed with that of oil of turpentine, and has rather an aromatic than a camphorated taste. It does not redden litimus paper. Water dissolves a very minute quantity, but cold alcohol of 0·806 dissolves fully one-third of its weight, and if hot much more, depositing as it cools, this excess in the form of crystals.

Hanging Bells.

Bell metal is a mixture of copper and tin, in that proportion which gives the hardest alloy—about 25 per cent of the tin, an overdose of which produces a softer alloy and very inferior tone. The metals should be very pure, so that the founder can rely on their quality. A small quantity of lead in bell metal insures a smoother and better casting, but it injures the tone of the bell.

In regard to hanging a bell there is only one certain mode to produce the loudest and most musical tone with safety from fracture, and that is the old fashioned way of bolting the crown to a block of timber of suitable form and dimensions, itself freely supported upon gudgeons and brasses bearing upon a framework and joists constructed of wood. The tongue should not be shackled to the ring or staple in the crown, but suspended to it by means of a strong loop of doubled hide.

The ultimate distance at which the sound of a bell may be heard depends upon many circumstances, principally on the mode of ringing and the formation of the bell chamber. The best position of the bell, if intended to be rung out, is in one of the windows, when at every return oscillation it will present its mouth to the country, and accurately represent the bell mouth of a trumpet.

When too large to be rung out, it should be suspended exactly in the center of the bell chamber, without incumbrance of any kind, or blinds, or weather boarding in the apertures, and the level of the brim should be at about one-third of the hight of the windows. In ringing large bells by the clapper, a very good imitation of ringing out may be obtained by means of two heavy beam treadles, sufficient to balance the weight of the clapper when near the brim or sounding bow. The connection with the clapper may be formed by a double rope passing over two large pulleys running freely on their bearings, or by a pair of bell-cranks. By treading on each lever alternately the bell is made to sound as if rung out with the greatest ease.

The splendid bell of St. Peter's, at Rome, is rung in this manner. It is over seventeen thousand pounds weight, or eight tuns, but the fine bell of Santa Maria del Fiore, at Florence, is rung out, though little inferior in weight.

These observations do not apply to small bells which must be thin at the edge in order to sound well, as they assimilate in some degree to the nature of the Chinese gong.

Selection of Solders.

Solders must be selected in reference to their appropriate metals. Tin plates are soldered with an alloy consisting of from one to two parts tin, with one of lead. Pewter is soldered with a more fusible alloy containing a certain proportion of bismuth, added to the lead and tin. Iron, copper and brass are soldered with spelter—an alloy of zinc and copper in nearly equal parts. Silver is soldered, sometimes with pure tin, but generally with silver solder, an alloy of five parts of silver, six of brass, and two of zinc. Zinc and lead are soldered with an alloy of from one to two parts of lead with one of tin. Platinum, with fine gold. Gold, with an alloy of silver and gold, or of copper and gold, &c. In all soldering processes, the following conditions must be observed :—The surfaces to be united must be entirely free from oxide, bright, smooth and level. The contact of air must be excluded during the soldering, because it is apt to oxidize one or other of the surfaces, and thus to prevent the formation of an alloy at the points of union. This exclusion of air is effected in various ways. The locksmith incases in loam the objects of iron or brass that he wishes to subject to a soldering heat ; the silversmith and brazier mix their respective solders with moistened borax powder ; the coppersmith and tinman apply sal ammoniac, resin or both, to the cleaned metallic surface, before using the soldering iron to fuse them together with the alloy.

Our Iron Clads from a Foreign Point of View.

The London *Times* contains the following, in an answer to J. Scott Russell, on iron-clad ships. It says :—

It is very curious to observe what the Americans are doing in this way. We should not attach much weight to their example, because all their vessels have been constructed for the special service of a domestic war, and are designed therefore for river duty or coast duty exclusively. Still they are working under the pressure of necessity, and all their products are brought immediately to the rough test of action. We find, then, that though they have built twenty-three iron-cased men-of-war since the commencement of hostilities, they have, nevertheless, built more than double that number of wooden ones, while they have not launched a single vessel of such a type as would content Mr. Scott Russell. We believe that the weakest vessel of our iron fleet would prove immeasurably more powerful than the strongest ship in the Federal Navy.

Mr. Scott Russell will tell us, perhaps, that the exploits of the *Arkansas* and the *Merrimac* are precisely calculated to prove his case, as showing what one good vessel may accomplish against a swarm of inferior ones, though claiming to be "iron-clad." We reply that a perfect vessel of the new model might undoubtedly disperse half a dozen imperfectly armed opponents, but we are not purposely or deliberately building imperfect vessels. The Americans have done so, because they felt dispatch to be more necessary than perfection, but we have always intended our ships to be excellent after their kind. Perhaps, in the case of the wooden vessels which we are plating with iron we have admitted a little compromise, partly for the sake of expedition, and partly for the sake of turning good materials to account ; but still it is by no means certain that a strong wooden ship strongly plated and armed on the shield principal may not be as good a specimen as any. The expediency of combining wood with iron in these fabrics is still a doubtful point. However, there is one point which is not doubtful, and that is that building wooden men-of-war is throwing money away.

Weekly Review of the Oil Trade.

The Oil City *Register*, in speaking of the oil business for last week, says :—

Shipments and receipts at this point have been comparatively light. Navigation is in a manner suspended, and there is a great scarcity of teams. Holders are generally firm at $1 per barrel at the wells. We have heard of one sale at the Sherman well, of 4,000 barrels at seventy five cents, but this price has been since refused. The ruling rates at this point are $1 00 @ 1 10. The market is rather unsettled, but seems to have an upward tendency. The demand is brisk, but transportation is difficult to procure. Several of the refiners here are duplicating the number of their stills, which is a healthy indication. It is estimated that by the 1st of October it will take some 1,000 barrels of crude oil daily to supply the refineries on Oil Creek.

Treatment of Gold and Silver Sulphurets.

At Freiburg in Germany, gold and silver sulphurets are treated by Professor Plattner, as follows :—

The sulphurets, after an impalpable pulverization, he subjects to a careful roasting. The roasted ore is then placed in a vat with its bottom perforated for allowing chlorine gas to impregnate the ores, and the gas to be retained in the covered vat for a certain time, say from twelve to twenty hours. The vat is then uncovered and water is poured over the entire mass of ore ; all the metal atoms which are held in the chlorine will pass off as chlorides, and may be collected by troughs leading from the bottom of the vat into receptacles, and the various metals precipitated.

Mexican Mustang Liniment.—The famous Mustang Liniment, which has received such a high reputation for curing sprains and chilblains, is composed of petroleum, aqua ammonia and brandy, mixed together in equal parts by measure. Refined petroleum is very excellent for mild chilblains without the admixture of any other ingredient, but the mixture with ammonia and brandy is more stimulating. It is applied by gentle rubbing. The human hand slightly warmed before a fire, is the best agent.

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THE COLOR PRODUCTS OF COAL—MAUVE AND MAGENTA.

The following is a most interesting chemical lecture by A. W. Hoffman, LL.D., F.R.S., lately delivered before the Royal Institution in London. This branch of chemical science has been cultivated with great assiduity and success by the lecturer, who is one of the most distinguished chemists of the age:—

The fact of the beautiful coloring matters known by these fanciful terms, mauve and magenta, being substances derived from coal, must, I presume, be familiar to every one of you. But there may be many unacquainted with the means by which this transformation is accomplished. It is to them that I address myself.

Coal to become color, has to pass through a series of stages of transition, each of which claims our attention for a moment. Briefly expressed, the aim of this address may be said to be, to show you the way from coal to color.

Color is intimately associated with light: without light there is no color. This remark applies in a double sense to the colors derived from coal; for it is to the introduction of gas light for illuminating our streets and houses, that we are indebted for the acquisition of these colors. This statement may appear strange, for nearly half a century has elapsed during which we have been in the possession of gas, whilst the transformation of coal into coloring matters has been achieved only recently under our own eyes. But you will immediately appreciate the truth of my assertion if I tell you that these substances are obtained from a secondary product, generated in the manufacture of gas, a product long used for a variety of purposes, but which, only within the last few years, the researches of chemists have proved to be an inexhaustible mine of wealth and interest.

The starting point, then, for the production of mauve and magenta, is the manufacture of coal gas; but this is so well known as not to need any detailed description. Let me briefly remind you of the principal features of the distillation of coal, by directing your attention to the two large diagrams representing the retort house and the condensers of a gas works. You observe how the coal is heated in stupendous retorts, five or seven of which are generally associated in one furnace. The gas ascends from these retorts in vertical tubes, the bent ends of which dip into a large horizontal pipe, partly filled with water, called the hydraulic main, a considerable amount of the oily and tarry substances generated with the gas being separated by the water. The gas, so far purified, passes on through the condensers—immense vertical iron pipes constantly cooled by a current of cold water which surrounds their external surface. In these condensers an additional quantity of oily matter is separated, which, together with the oily substances deposited by the gas during its passag through the hydraulic main, is collected in appropriately-placed cisterns. The gas, having traversed the condensers, passes through a series of further purifications before it is delivered into the mains of our streets; but these, unconnected as they are with our subject, must no longer occupy our attention.

It is in the oily products, the so called coal-tar oil, that our interest is centered. To my mind this coal-tar oil is one of the most wonderful productions in the whole range of chemistry. That may be rather a one-sided view, but having in younger years spent much time in the investigation of this substance, I have acquired quite an affection for it. Nor can you fail to appreciate the interest which coal tar presents to the chemist when you look at the diagram in which I have endeavored to arrange synoptically the various substances which have been eliminated from it.

PRODUCTS OF THE DESTRUCTIVE DISTILLATION OF COAL.

Name.	Formula.	Boiling Points. Degrees.
Hydrogen	H H	
Marsh gas, or hydride of methyl	C H_3, H	
Hydride of hexyl	C_6 H_{13}, H	
Hydride of octyl	C_8 H_{17}, H	
Hydride of decyl	C_{10} H_{21}, H	
Olefiant gas, or ethylene	C_2 H_4	
Propylene or tetrylene	C_3 H_6	
Caproylene or hexylene	C_6 H_{12}	55
Œnanthylene or heptylene	C_7 H_{14}	
Paraffine	C_n H_{2n} (?)	
Acetylene	C_2 H_2	
Benzole	C_6 H_6	84
Parabenzole	C_6 H_6	
Toluol	C_7 H_8	114
Xylol	C_8 H_{10}	126
Cumol	C_9 H_{12}	150
Cymol	C_{10} H_{14}	175
Naphthalin	C_{10} H_8	212
Paranaphthalin or anthracen	C_{14} H_{10}	
Chrysen	C_{12} H_4 (?)	
Pyren	C_{30} H_4	
Eupion	(?)	
Water	H H } O	100
Hydrosulphuric acid	H H } S	
Hydrosulpocyanic acid	H (C N) } S	
Carbonic oxide	C O	
Carbonic anhydride	C O_2	
Disulphide of carbon	C S	
Sulphurous anhydride	S O_2	
Acetic acid	H (C_2 H_3 O) } O	120
Phenylic acid or alcohol, *phenol.*	H (C_6 H_5) } O	188
Cresylic acid or alcohol, cresol	H (C_7 H_7) } O	203
Phlorylic acid or alcohol, phlorol	H (C_8 H_9) } O	
Rosolic acid		
Brunolic acid	(?)	
Ammonia	H H H } N	
Aniline	C_6 H_5 H H } N	182
Cespitine	(C_5 H_{13})‴N	96
Pyridine	(C_5 H_5)‴N	115
Picoline	(C_6 H_7)‴N	134
Lutidine	(C_7 H_9)‴N	154
Collidine	(C_8 H_{11})‴N	170
Parvoline	(C_9 H_{13})‴N	188
Corodine	(C_{10} H_{15})‴N	211
Rubidine	(C_{11} H_{17})‴N	230
Viridine	(C_{12} H_{19})‴N	251
Chinoline or leucoline	C_9 H_7 N	235
Lepidine	C_{10} H_9 N	260
Crytidine	C_{11} H_{11} N	
Pyrroll	C_4 H_5 N(?)	
Hydrocyanic acid	H C N	

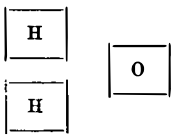
This is rather a formidable list of compounds; their names, too, are not always remarkable for smoothness and melodious character, although I should not omit to state they are tame and domestic when compared with some of the terms which chemists of late have been under the painful necessity of inventing and inflicting. You need not be afraid, however, that I shall trouble you with many details about these substances. Most of them, though highly interesting for more than one reason, more especially when considered from a purely scientific point of view, are of no importance for our present subject, and need not therefore specially be noticed. In fact, the only coal derivatives which, in connection with mauve and magenta, claim our attention, are benzole, phenol and aniline; those certainly we must by-and-by examine somewhat more in detail.

But before doing so, you legitimately expect that I should endeavor to give you some idea of the nature of the process in which this endless variety of compounds is generated from coal. Were I to tell you simply that coal consists of carbon, hydrogen, nitrogen, oxygen and sulphur, not to mention the ash which is left after combustion, and that you may therefore look upon coal as a sort of magazine of these several elements, capable, under the influence of heat, of associating in an infinity of forms and proportions, you would have learnt comparatively little. Let me attempt to convey to you a somewhat more precise idea of the processes involved in the distillation of coal. For this purpose you must allow me to remind you of some of the general results elaborated by the researches of chemists during the last ten years, which at the first glance appear but little connected with mauve and magenta.

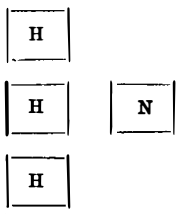
The infinite number of substances, mineral, vegetable or animal, which form our planet, variously as they are composed, may be referred—chemists now pretty generally agree—to a comparatively small number of types of construction. Opinions are divided respecting the actual number of these types, and even the choice of typical bodies is still a subject of discussion among chemists. But whatever the special views of particular schools may be, the number of types is always small, and among them almost invariably figure hydrogen, water and ammonia. The comprehension of the meaning attached by chemists to the term "types" may perhaps be facilitated to you by a glance at three models which I have had constructed for this purpose, and which for the sake of convenience I may be allowed to designate as type molds.

Chemists assume that the smallest particle of hydrogen which exists in the free state, or, to use the chemical phrase, the molecule of hydrogen, consists of two atoms of hydrogen. The first of our type molds, then, charged as it is with one atom (one volume) of hydrogen, associated with another atom (one volume) of hydrogen, represents the molecule of hydrogen.

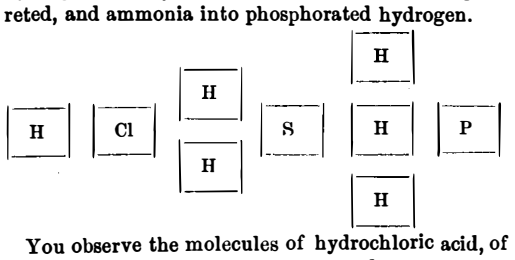
In water, as you know, we have two atoms (two volumes) of hydrogen, associated with one atom (one volume) of oxygen. (Equivalents used: H=1; O=16; S=32; C=12; N=14; Cl=33.5, &c.) You are reminded of this fact by our second type mold which represents the molecule of water.



In ammonia, lastly, you have three atoms (three volumes) of hydrogen united with one atom (one volume) of nitrogen, a form of construction which is recorded in our third type mold representing the molecule of ammonia.



Nothing is easier now than to trace the derivation of other substances from hydrogen, from water, from ammonia. Let me remove from our three type molds one atom respectively of hydrogen, oxygen and nitrogen, and fill the places thus vacated with atoms of chlorine, sulphur and phosphorus, and I have, without giving you the slightest inconvenience, converted hydrogen into hydrochloric acid, water into sulphureted, and ammonia into phosphorated hydrogen.



You observe the molecules of hydrochloric acid, of sulphureted and of phosphorated hydrogen respectively contain the same number of atoms which are present in the molecules of hydrogen, of water and of ammonia. We have thus indicated that hydrochloric acid is constructed upon the hydrogen type, sulphureted hydrogen upon the water type, phosphorated hydrogen, lastly, upon the type of ammonia. The three bodies just considered were formed by the insertion of elementary atoms; but our type molds receive compound atoms with the same facility.

(To be continued.)

It has been calculated that the fibers of pure Sea Island cotton average one inch and three-quarters in length. If it were possible to place the fibers end to end, one pound would extend 4,777 miles.

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PROPORTIONS OF LOCOMOTIVES.

The following important and useful information is from the London *Engineer*:—

It has been the custom with some locomotive makers to make a calculation of the "cubic feet of steam used per mile" in the cylinders of their engines, and we once knew a builder who contended with considerable energy that a 16-inch cylinder passenger engine, with 7-feet wheels, required a smaller boiler than a 16-inch cylinder goods engine with 4½-feet wheels, inasmuch as the former expended a less number of "cubic feet of steam per mile." It had quite escaped his attention that the smallest possible boiler would supply as much steam per mile as a larger one, provided only that sufficient time were given in which to raise the steam. Hence, as a general fact, the various rules for proportioning locomotive boilers from the diameter of the cylinder are founded upon a wrong principle, and all successful builders of fast engines are well aware that more boiler room is necessary than these rules commonly allow. A passenger engine and a goods engine may both have the same diameter of cylinder and length of stroke, the former having 7½-feet and the latter 5½-feet wheels. While the former may run sixty miles an hour, the latter may be considered fast at twenty miles. In the former the corresponding speed of piston may be 1,000 feet per minute, while in the latter it may be 500 feet in the same time. Hence the cylinders of the passenger engine will be emptied more that twice as rapidly as those of the goods engine, and if the average pressure of steam upon the piston, throughout the stroke, were the same in each case, the passenger engine would require to have a boiler of more than twice the evaporative power of that of the goods engine, in order to maintain its speed and to supply itself with steam. The quantiiy of water evaporated, in cubic feet or in gallons per hour, is the only real standard of the power of an engine, and fast engines must necessarily have greater boiler capacity than those intended for slow trains. At a speed of fifteen miles an hour, the resistance of a train of given weight may be 10 lbs. only per tun, while at thirty miles an hour the resistance may be 20 lbs. per tun. The resistance does not increase in the direct ratio of the speed, for the mere rolling friction is constant at all speeds, while the resistance due to blows, jolts, and the atmosphere, increases as the square of the speed. But if the increase of the latter resistance be such, as it generally is, as to double the whole resistance at a speed of thirty miles an hour, then must the engine not only overcome twice the resistance at every moment of its progress, but it must also exert this double draught through twice the space, and hence it must exert four times the power required at the lesser speed. The average total pressure upon the pistons would require to be doubled, either by increasing their area or the density of the steam admitted to them, and the pistons, at the same time, would move twice as fast as at the slower speed.

There are still no rules which can be implicitly depended upon for proportioning locomotives. Not that a locomotive, proportioned according to any of the usual formula, would not work, or that it would not work with average success, but the proportions which will afford the best results are still unascertained. An allowance of 0.6 of a square foot of firebox surface and six square feet of tube surface is usual for the evaporation of each cubic foot of water per hour, but with combustion-chamber boilers these proportions become nearly one square foot of firebox and only four or five square feet of tube surface. The efficiency of tube surface depends greatly upon its disposal and upon the form of the smokebox and arrangement of the exhaust pipes. The increasing size of the grates for burning coal is generally attended with an increase in the area of firebox surface, although obviously no more heating surface, as such, simply, is required for coal than coke. The tube surface was formerly increased by crowding very small tubes very closely together, whereas larger tubes, separated at a greater distance, and presenting, consequently, a smaller extent of surface, are now found preferable. We have seen 1¾-inch tubes set within ⅜ inches of each other at the smokebox end, whereas ¾-inch spaces for 2-inch tubes are now preferred. With combustion chambers the tubes, being short, are made, of course, much smaller than where they extend for the whole length of the boiler. 6-feet tubes, 1⅝ inches in diameter, are used in such boilers, while in some coal-burning engines the 5½-feet tubes are 1⅛ inches only in diameter, and a few boilers have been made, with nearly 500 tubes each, only 22 inches long and ⅞ inches in diameter. Respecting other proportions of locomotives it may be said generally that large steam room and large steam pipes tend to give dry steam, long steam ports and a long throw of the valve, are altogether preferable to the opposite proportions, provided the valve is balanced, so as to work with the minimum of friction; a long stroke, say one-half greater than the diameter of the cylinder, is now preferred to any shorter length; while with the gradual introduction of steel in place of wrought iron, the proportions of the working parts are being in many cases modified. For bearings, however, the wearing surface has been generally increased within the last three or four years. Driving axle journals, which were formerly made but 6 inches or 7 inches long, are now from 7½ inches to 9 inches long. In all the details of locomotives constant changes of construction and proportion are being made, and while no exact rules can be framed for proportions, it is doubtful if the adoption of any rules, pretending to exactness, would be advantageous.

VALUABLE RECEIPTS.

Elderberry Wine.—As the season is at hand for collecting elderberries we have had a number of inquiries regarding the mode of making wine from them. We will give two receipts, which will be found reliable if carefully followed. First, take elderberry juice, 10 gallons; water, 10; white sugar, 45 pounds; red tartar, 8 ounces. These are put into a cask, a little yeast added, and the whole is fermented. When undergoing fermentation ginger root 4 ounces, allspice 4 and cloves 1 ounce, are put into a bag of clean cotton cloth and suspended in the cask. They give a pleasant flavor to the wine, which will become clear in about two months, and may be drawn off and bottled. Some add brandy to this wine, but if the fermentation is properly conducted this is not necessary. Second, take 5 gallons of elderberries and boil them for half an hour in the same quantity of water, adding half an ounce of cloves, 2 of ginger and 2 of cinnamon. The whole are strained through a clean cotton cloth or a hair sieve, and considerable pressure is used to obtain all the juice. This is now put into a cask, 15 pounds of brown sugar stirred in and the whole fermented. It takes from two to three months before fermentation is completed and the wine ready to be bottled. The flavor of this wine is very similar to that obtained from the grapes of Oporto in Portugal.

Blackberry Wine.—The following is a receipt for making wine from blackberries by A. Orth Behm, of Lafayette, Ind., who has made this kind of wine successfully for several years. He says:—To each quart of juice take three quarts of water and three pounds of sugar—brown will do. If you have plenty of juice you can use less water and it will much improve the quality. One bushel of berries, if good, will make ten gallons. Mix thoroughly, strain and put into a strong cask, which should be well cleansed and fumigated. The cask must be full to allow the refuse to work out during the process of fermentation. You must fill up the cask thrice a day with fresh water, so that the refuse will all run out. Put a spigot into the cask before putting in the wine, and slant it enough to prevent the dregs from running out when you are racking off. Cork the cask tightly after it has fermented, unless you should choose to fill it into champagne bottles, cork and wire them and then seal. This will give you a sparkling wine vastly superior to any Catawba and much cheaper.

Smoky Chimneys.—A correspondent of the London *Builder* gives the following cure for a great and common evil:—"A smoky chimney and a scolding wife are two of the worst evils of domestic life, says the old proverb," and to obviate the first evil ingenuity is ever racking its brain. Hence, Regent street and every part of the metropolis has its house tops bristing with pipes and deformed by cowls in every conceivable and almost inconceivable variety. Now, I have built many chimneys in all possible situations and have found one simple plan everywhere succeeded, the secret being only to construct the throat of the chimney, or the part just above the fireplace, so small that a man or a boy can barely pass through it. Immediately above the chimney should be enlarged to double its width, like a purse, to the extent of about two feet in hight, and then diminished again to the usual proportions. No chimney that I ever constructed thus smoked.

Java Coffee and Pepper.

In extent Java is about seven hundred miles in length, and it varies from eighty to one hundred and forty miles in width. Its area is less than twenty thousand square miles. The face of the country is more or less broken by mountains, but the soil generally is rich and productive. The products are rice, sugar, coffee, pepper, spices and a profusion of the finest tropical fruit. Coffee is cultivated to as great perfection as in almost any other part of the world. It grows upon large bushes, and the grains of coffee are formed two in a berry about the size and shape of our common plum. The skin of the berry is about as thick as that of the plum, and the color, when ripe, a pale scarlet.

The bush is very productive. Every branch is loaded with the berries, which grow two in a place on the opposite sides of each other, and about an inch and a half apart. When ripe the skin bursts open and the grains of coffee fall out upon the ground; but a more general way is to spread something under the bush and shake the coffee down. After the outer skin is taken off there remains a kind of husk over each kernel which is broken off (after being well dried in the sun) by heavy rollers. The coffee after this needs winnowing in order to be freed from the broken particles of the bush. It has been said by some writers that one bush with another, will not average more than a pound of coffee.

Black pepper is also raised to some extent on the Island of Java; but Sumatra, which lies just across the straits, is by far the most celebrated for this commodity. Her pepper is, perhaps, the finest and most abundant of any one country in the world. Black pepper grows on a vine very much like our grape vine. The pepper grows and looks, when grown, very much like our currants. There is this difference, however, the currant has each its own distinct stem, but the pepper has not, every grain grows hard on to one common stem, just as each grain of Indian corn does on the cob. The color of the pepper, when first ripe, is almost a bright red, and changes to the dead black by being exposed to the heat of the sun.

The white pepper is nothing more than the common black with the outer skin taken off. It is first soaked until this skin bursts open, which is then rubbed off and the grain dried. The white is not considered so pungent as the black though it is nicer and more expensive, as more labor is necessary in order to prepare it.

Transplanting Trees.—As soon as the foliage has dropped transplant ornamental, shade or fruit trees. There will be a saving of one year's growth between those planted now and those in the spring. In taking up trees great care should be taken not to mutilate their roots, for every fiber of the root lost the growth of the tree will be retarded so much and its life endangered. Whenever it is absolutely necessary to part with any of the roots take off the top in proportion. Let the holes be larger than the roots and never bend or cramp a root into a small hole. Where the root is mutilated make a clean cut with a sharp knife, and new rootlets will show themselves pushing out between the bark and wood. If the soil is poor fill in the holes with rich earth from the woods or swamps. But in no case use stable manure in planting out trees in this climate. Topdress the ground among your trees with leached ashes, lime or any decomposing vegetable matter. If rabbits are troublesome in barking your fruit trees apply soft country soap to the trunks two or three times in the year.

New Judge Advocate General.—We are happy to learn that Hon. J. Holt, formerly Commissioner of Patents, has been appointed by the President, Judge Advocate General of the army, with the rank of Colonel. He will enter upon his duties without delay.

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Correspondence

Light Locomotives—Traction on Inclines.

Messrs. Editors :—The numerous passenger railways in and around our city, and tram roads about our coal pits and oil wells in this region, give the following question great importance, viz. :—In what degree is the power or draft of a locomotive affected by the gradient of the track? Our roads are mostly pretty steep, but the desire is to dispense with horse power on them wherever it can be done, and to introduce in its stead small locomotives of from four to eight tuns in weight with four wheels—all drivers; and the question is on what grade will this be practicable?

The diversity of opinion on the subject is wonderful. Some affirming that on a grade of over one foot to the hundred locomotive power would be impracticable; others that on a grade as high as even four or five feet, it would be both practicable and profitable for light drafts, as passenger railway cars. Especially so if the locomotive were not too heavy and all the wheels drivers.

It struck me that the question is one of such immediate practical importance that it must have been solved long since, and reduced to certain and fixed rules, and that many of your host of readers can, if they will, refer us to where we can find the desired information, or can give us the fruits of their own experience. James Scott.

Pittsburgh, Pa., Sept. 7th.

[The arithmetical rule for ascertaining the traction of an engine in pounds is to multiply the area of the cylinder in inches, by the pressure per square inch on the piston, this product by the length of stroke in feet, and divide by the diameter of the driving wheel in feet. Or if the length of stroke be taken in inches the diameter of the driving wheel must be expressed in inches also. The principal element of traction is the rate of evaporation in the boiler. The Pennsylvania Central Railway from Altona to Gallitzin has a grade averaging 87½ feet per mile; the grade on the New York Central between Albany and Schenectady is 65 feet per mile for three miles; and the Western Railroad of Massachusetts has several grades ranging from 55 to 83 feet per mile. On the Caledonian Railway in Scotland there is a very long incline on which the rise is one foot in 76, or about 68 feet per mile. Mr. D. R. Clark has driven the ordinary passenger engine with 15-inch cylinder and 20-inch stroke, with 6-feet driving wheels up this grade at the rate of 20 miles per hour. The engine tender and train weighed 70¼ tuns. The pressure in the boiler was 90 lbs. per square inch; on the pistons 47½ lbs. per square inch, and the evaporation in the boiler was at the rate of 87 cubic feet per hour. The most elaborate and practical article on the traction of locomotives that has appeared lately is by Zerah Colburn in the London *Engineer* of July 4 and 11, 1862. The examples which we have cited will convince all those who think that a grade of over one foot to the mile is impracticable, that they are in error. We will cite another case to the point respecting small locomotives, such as those mentioned for street railways. There is a locomotive now running on a short line of tram railway near Whitburn in Scotland, and it takes loads of 24 tuns up an incline of 1 foot in 40 at the rate of eight miles per hour. This engine has cylinders only 8 inches in diameter; stroke 15 inches; four wheels coupled, 27 inches in diameter, and its total weight in working trim is about 7 tuns. This little engine draws loads on grades of 3 feet in the 100, and may be a practical guide to those who wish to apply such a class of locomotives in place of horses on city railways.—Eds.

Action and Re-action.

Messrs. Editors :—When two bodies one of which has double the mass of the other are free to move and acted upon by a force between them so as to give them motion in opposite directions, the velocities which they receive will be inversely as their masses. This is capable of easy proof by experiment, and what is as much to our purpose of as easy disproof by the theory of the effects of forces. But let us regard the phenomenon until we are satisfied that it harmonizes perfectly with some known truths. Neither body having any velocity at the commencement of the time during which the force acts upon them and their terminal velocities being related as one to two, their average velocities must bear the same relation. But if the average velocity of the one through a certain length of time has been twice that of the other then the distance through which it has moved during the action of the force is double that gone over by the other. A body free to move and having force expended upon it in overcoming its inertia, will possess by virtue of its velocity a force exactly equal to that consumed in giving it motion. The measure of the consumption of force is its intensity multiplied into the distance through which it acts. Since in this case the force has acted with equal intensity upon the two bodies, but through unequal distances, the forces expended upon each, and hence that possessed by each will be to the other in the same ratio as are the distances through which they moved during the action of the force viz., one to two. Now when we reflect that the living force of a moving body is as the mass multiplied into the square of its velocity, and so a body whose weight is one and velocity two will possess twice the force of one whose weight is two and velocity one, we will see an entire accord between the theory—so much of it as has been stated—and the practice. But I have already said there was a discord and to the question where is it? With modesty let me reply that in the experiment above mentioned and in all similar ones action and re-action appear to be to each other inversely as the masses of the bodies. But the fundamental principle of mechanics is that action and re-action are always equal. By no means do I ask that an honored and so far as we are informed until now an unquestioned aphorism of philosophy, be discarded, but will be thankful to the scientific public for instances in which in any true sense of the words action and re-action when between bodies of unequal masses are equal. Those supposed examples of the action of the principles in question given in numerous books of great merit should, so far as I have examined, produce doubt rather than conviction, of which I will be pleased to attempt the proof whenever called upon; but if in the above I have so entirely misapprehended as to render answer unmerited I crave pardon for the obtrusion. Isaac E. Craig.

Cleveland, Aug. 3, 1863.

The Way to Make Chlorate of Potash.

Messrs. Editors :—Would you be so kind as to let me know through your paper the cheapest method known of making chlorate of potash—the commercial kind. I should like to know, first, the materials; second, their exact proportions; third, the trade process. A Subscriber.

Catasauqua, Pa., Sept. 1, 1862.

[Chlorate of potassa is produced on a large scale by the following method, which has been found to answer better than any other. One part of chloride of potassium and two parts of hydrate of lime are reduced with water to a thin cream, and chlorine gas—prepared in the ordinary way from binoxide of manganese and hydrochloric acid—passed through the menstruum till it assumes a pinkish color, which is due to the formation of traces of hypermanganic acid. A little manganese passes over during the operation, and when no more chloride is required for the alkaline bases, water is decomposed and hypermanganic acid produced. The annexed equation represents the principal change :—

$$\underbrace{K\,Cl}_{\text{Chloride of potassium.}} + \underbrace{6\,Ca\,O}_{\text{Lime.}} + \underbrace{6\,Cl}_{\text{Chlorine.}} = \underbrace{KO\,Cl\,O_5}_{\text{Chlorate of potassa.}} + \underbrace{6\,Ca\,Cl}_{\text{Chloride of calcium.}}$$

The vessel holding the solution is of any convenient form, and is provided with agitators of all shapes and sizes, depending upon the whim or caprice of each manufacturer. It is connected with a similar one containing a fresh charge of the same materials, by means of a waste pipe, through which all the escaping gas passes to be there absorbed. When the liquid in the former is ready to be drawn off, the gas is made to enter the latter, and the connecting pipe between the two cisterns takes the unabsorbed chloride to the first vessel, which when empty, is refilled immediately, so that very little time or gas is lost. The saturated liquor is, when drawn off, evaporated to 34° Twaddell, and the mother lye to 46°, if two crops of crystals are desired; if only one, then the menstruum is at once evaporated to 60°. The crystals, after being well washed, are drained on a cone having a small aperture at the bottom, and are afterward dried upon iron plates heated by steam. The chloride of calcium is the only other compound present. Some manufacturers re crystallize them, so as to produce a first rate article. The principal manufacturers of this salt are, Albrights, of Birmingham, Gambles, of St. Helen's, James Muspratt and Sons, of Liverpool, and Frederic Muspratt, of Woodend, near Warrington, Lancashire. The annual production is nearly five hundred tuns. The principal use to which it is applied are in bleaching, making lucifer matches, and for pyrotechnic purposes.—Eds.

The Formation of the Whirlpool.

Messrs. Editors :—In the Scientific American of Aug. 30th., Mr. R. S. Stevens requests to know the cause of the circular motion or whirl of water when running out of a vessel of any size or form, as a common pail, through an orifice in the center of the bottom to which is attached a piece of tube, and also why the discharge of the water is accompanied by the forcible passage of air through the tube. The following has occurred to me as an explanation :—The water that first escapes is that immediately over the tube which descends by its gravity, the remainder resting on the bottom of the pail. As the column descends its place is partly supplied by the particles of water lying next to it and nearest the surface, these in turn as they descend are replaced by the particles lying next to them, and so on until the vessel is empty; but the descending column of water is not entirely replaced by the adjacent particles and presently the amount of water passing out is not sufficient to fill the tube, when owing to slight inequalities in the tube the water does not flow evenly down the sides, nor does it flow in a body down on one side, but passes down in a spiral course, causing the water to whirl sometimes to the right and sometimes to the left I have seen it whirl in both directions; the air which fills up the space unoccupied by the fluid is drawn—sometimes quite forcibly—through the tube by the spiral motion of the water. Might not the same principle be applied to ventilating purposes by causing a spiral flange, fitting air-tight in a cylinder to rotate rapidly, thus causing a current of air to pass through the cylinder? A. H. Ward.

Philadelphia, Pa., Aug. 23, 1862.

Rifle Sights---Dead Black on Brass.

Messrs. Editors :—I have been informed that the dead black on the eye pieces and interior of French spyglasses is produced with the nitromuriate of platinum, platinum dissolved in a mixture of aquafortis and muriatic acid.

The best open sights for a rifle in my opinion, consist of a back sight with a right-angled dead black notch in it, and a front sight of silver. But the globe sight is superior to notched back sight, and it may be used nearly as rapidly as the open sight.

L. F. M.

Rochester, N. Y., September 7, 1862.

The Resistance of Swinging Plates.

Messrs. Editors :—The soundness of your opinion in regard to the resistance of swinging plates to the impact of cannon shot was proved by experiments made here a few years since. In firing at plates of different thicknesses with guns of caliber varying from 6 to 68 lbs. the plates were merely set up on one end without support, and received almost the full damage of the shot. The 68-pound ball penetrated some distance, and broke completely in two, a tough 5½ or 6-inch plate thus placed. S. D.

Preserving Wood by Salt.

Messrs. Editors :—Some time ago you had an article in your paper in relation to the preservation of timber. I wish to state here what I have done and seen others do, and it has always had a good effect, and I want you to state what you think of it, and whether you can give any scientific reason for it. I have used common salt for the preservation of mill shafts or water-wheel shafts, and it has had a good effect in staying the decayed timber. Take a two-inch augur, bore holes into the stick of timber, and

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fill up with salt, and then plug up the holes tight. In a large stick of timber like a water-wheel shaft, bore a hole through the center like a pump, and fill up with salt and plug up, and there is no telling how long this may last, as it has been tried with us, and has answered very well. No man would believe what effect it will have till he tries it. I have used it in a mill shaft that was decaying, and it certainly has helped it wonderfully. I have never seen a salt barrel but what was sound, and will stand more wet weather than any other barrel or stave of its kind.

JNO. B. SIMONS.

Brush Valley, Ind., August 21, 1862.

The Way Military Engineers are Educated in France.

Dr. Kennedy, President of the Polytechnic College of Pennsylvania, having at the request of Governor Curtin, visited the famous military engineering school at Metz, gives the following account of it; for a copy of which we are indebted to Prof. Dwight D. Willard, of the Polytechnic College :—

METZ, July 30, 1862.

To their Excellencies Governor Curtin, of Pennsylvania, and Governor Ogden, of New Jersey—GENTLEMEN :—The readiness with which you have ever executed measures calculated to improve military education in your respective States, as well as the interest you have been pleased to express in the Polytechnic College, Philadelphia, over which I have the honor to preside, prompts me to lay before you, in advance of my return, a few of the facts learned by a visit to the School of Artillery and Engineering here. This quaint old town, which is famous for the strength of its fortifications, and which has a military renown dating antecedent to the discovery of America, is, as you know, one of the great fortresses of France on the German frontier, off the favorite routes of the towns. It is seldom visited by our countrymen and is but little known at home, although we often hear of St. Cyr, near Paris, the seat of a School of Infantry and Cavalry merely. No Frenchman can enter as a student here unless he has first graduated at the Polytechnic School in Paris. The theoretical portion of the course must indeed have been completed there. The instruction here is of the highest grade and essentially practical. The average age of the students is about twenty-one years. Their number varies with the wants of the service. During the Crimean war it ran up to 150; it is now, including eight *externes*, 126; of these *externes* it is simply necessary to say that they are admitted as an act of courtesy toward the foreign nations to which they respectively belong, and that they do not lodge with the regular students. These are divided into two grades, whom we may call first-year men and second-year men, one being admitted during each of the two years which constitute the course. These are again divided into artillery men and engineers, making actually four classes, although, as the studies of the artillery men and engineers are frequently the same the classes are often united. This school, as well as the School of Mines, the School of Roads and Bridges, the School of Naval Engineering, &c., is annually recruited from the graduates of the Polytechnic School at its annual commencement, in the following manner :—These graduates are divided according to their averages, into four grades. The members of the highest grade have the first chance of vacant scholarships in the professional schools. The members of the second and of the other lower grades, must necessarily take the scholarships left by the grade next above them, and as there are always fewer scholarships than there are graduates of the Polytechnic the competition is active, and the government saves itself the expense of further educating men of insufficient energy and intelligence. These must retire to private walks of life. Students who choose the school at Metz receive per annum 1,600 francs and their lodging, which is of the best description. Upon completing their curriculum they are commissioned as lieutenants. This curriculum consists of courses on military art, on military administration and on field fortifications; of a course on science as applied to the military art, in furnaces, foundries and the casting and working of the metals, &c.; a course on military architecture and the construction of permanent fortifications whether of stone, iron, earthwork, &c.; of a course on topography and geodisy; a course on applied mechanics, and on design; a course on the study of the horse (hippentrigue), his history, habits, breeds, training, &c., and a course on the German language. A good idea of the thoroughness, as well as the practical character of the instruction may perhaps be conveyed by reference to that on design. Here all must be original; drawing from copies is forbidden. The Professor gives a general specification, say of a permanent fortification to all the class, varying slightly with each member, who, before he leaves the exercise, must draw a definite plan. If this is approved, he is on the subsequent days to prepare enlarged working drawings of his ideal construction, in elevation, ground plan, and section, and accompany them with descriptive text. From the plan of field fortifications presented by the class one is selected for construction. The facines are cut, gabions made, sand bags filled, trenches dug, traverses and embankments executed by the class, the humbler as well as the higher duties being performed by the students. Afternoons are devoted to practical exercises, of which the maneuvers with the artillery constitute an important part. These are begun in a large building with graveled floor. One party of students draws the guns, another performs the manual, sponging, loading, &c. The scene is afterward changed to the large practising ground where horses are attached to the guns, and the movements more nearly resemble those of actual battle. Other illustrations might be adduced under this head if necessary. It is almost useless to say that a corps of engineers is, according to all good authority upon the subject, the most effective representation of a standing army that a free state can maintain. It is also the cheapest, from the smallness of its number, and the safest, from the intelligence and character of its members. It constitutes a nucleus around which may be rallied at any time all the other corps of a large army, and a camp of instruction with competent officers be at once formed. Happy am I to know that men able to form such a nucleus have gone out from the Polytechnic College, and are now officers in the regiments of Pennsylvania and New Jersey in the war for the Union. Most happy shall I be if the examination I am now making of the military schools of Europe may serve still better to adapt our American institutions to supply the military necessities of the loyal and noble commonwealths over which you preside.

Very respectfully, your obedient servant,

ALFRED L. KENNEDY.

Confusion about Horse Power of Engines.

The following sensible comments on the subject of horse power are from the London *Engineer* :—

At present not less than six different rules are adopted in different places, and by different makers, nearly all giving different results; thus, strange as it may seem, in Glasgow an engine is not the same power that it is in Leeds or London. Mr. Fairbairn calculates the power of his engines by "multiplying the area of the piston by 7 lbs. the square inch, and by 240, the speed of the piston in feet per minute." The Admiralty rule is, "multiply the square of the diameter of the piston in inches, by its velocity in feet per minute, which must be as follows :—For a 4-foot stroke, 196 feet per minute; for a 5-foot stroke, 210 feet per minute; for 6-foot stroke, 222 feet; for 7-foot stroke, 231 feet; for 8-foot stroke, 240 feet per minute, and divide the result by 6,000." Boulton and Watt's formula is 33,000 lbs. raised 1 foot in a minute; but, strange as these rules may seem, they yield to the Leeds, Manchester and Glasgow rules, which are at the first place to allow sixteen circular inches, at the second ten square inches, and at the last ten circular inches of piston area per nominal horse power: these last rules at least show the most delightful simplicity if they have no other merit; but we might as well try to calculate the power of an engine from the diameter of the piston rod or the weight of the flywheel. The *Persia's* engines, with 10-foot stroke and 101-inch cylinders, are called 818-horse power. While the *Warrior's*, with 112-inch cylinders, which, deducting the 41-inch trunk, are about equal to 103 inches, are called 1,250-horse power, though they have but 4-foot stroke; and we would not weary our readers by heaping up instances to prove what we believe is pretty well known, that the term "nominal horse power" is useless and unexpressive, and it is in vain to say that a standard is necessary when we are at this moment doing very well without one. No engineer can tell from the mere size alone, of an engine, what its power may be. All the purchaser requires to know are the actual dimensions of his engine and boiler, and the quality of the fuel he is about to employ, in order to calculate what amount of work it is capable of performing. It is thus that locomotives are bought and sold without the use of any such absurd term, the use of which must often lead to confusion in the mind of the purchaser, who is seldom very well up in these matters. Its use gives an opening to the fraudulent dealer, in an engineering point of view no such term is necessary, and the present multiplicity of arbitrary rules are quite unsuited to the commercial requirements of the age.

Never Too Old to Learn.

Socrates, at an extreme age, learned to play on musical instruments, for the purpose of resisting the wear and tear of old age.

Cato, at eighty years of age, thought proper to learn the Greek language.

Plutarch, when between seventy and eighty, commenced the study of Latin.

Boccaccio was thirty years of age when he commenced his studies in polite literature, yet he became one of the three great masters of the Tuscan dialect, Dante and Petrarch being the other two.

Sir Henry Spelman neglected the sciences in his youth, but commenced the study of them when he was between fifty and sixty years of age. After this time he became a most learned antiquarian and lawyer.

Colbert, the famous French minister, at sixty years of age returned to his Latin and law studies.

Ludovico, at the great age of one hundred and fifteen, wrote the memoirs of his own times. A singular exertion, noticed by Voltaire, who was himself one of the most remarkable instances of the progress of age in new studies.

Ogilby, the translator of Homer and Virgil, was unacquainted with Latin and Greek till he was past fifty.

Franklin did not fully commence his philosophical pursuits till he had reached his fiftieth year.

Accorso, a great lawyer, being asked why he began the study of law so late, answered that indeed he began it late, but he should therefore master it the sooner.

Dryden, in his sixty-eighth year, commenced the translation of the *Iliad;* and his most pleasing productions were written in his old age.

Salt and its Offices.

Some modern agricultural writers have doubted the necessity of giving animals salt. The remarks as to the effect of salt upon health, by Professor Johnston, may be relished by those who still put salt in their own puddings, and allow their cattle a little now and then. He says :—

The wild buffalo frequents the salt licks of North-western America; the wild animals in the central parts of South Africa are a sure prey to the hunter who conceals himself behind a salt spring; and our domestic cattle run peacefully to the hand that offers them a taste of this delicious luxury. From time immemorial, it has been known that, without salt, man would miserably perish; and among horrible punishments, entailing certain death, that of feeding culprits on saltless food is said to have prevailed in former times. Maggots and corruption are spoken of by ancient writers as the distressing symptoms which saltless food engenders; but no ancient or unchemical modern could explain how such sufferings arose. Now we know why the animal craves salt, why it suffers discomfort, and why it ultimately falls into disease if salt is for a time withheld. Upward of half the saline matter of the blood (75 per cent) consists of common salt, and as this is partially discharged every day through the skin and the kidneys, the necessity of continued supplies of it to the healthy body becomes sufficiently obvious. The bile also contains soda as a special and indispensable constituent, and so do all the cartilages of the body. Stint the supply of salt, therefore, and neither will the bile be able properly to assist the digestion, nor allow the cartilages to be built up again as fast as they naturally waste.

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Improved Coal Oil Pyrometer.

Petroleum is a mixture of a large number of hydrocarbons, some of which are solid, others are liquid, and others are gaseous at moderate temperatures. All are combustible, but those are most inflammable which are most volatile. None are explosive, but if the vapor of rock oil is mixed with oxygen or with atmospheric air in certain proportions, an explosive compound is formed by the mixture. In the process of preparing the rock oil for illuminating purposes, there is sometimes so large a portion of the light hydrocarbons left in the liquid, that the evaporation at moderate temperatures will be sufficient to form an explosive compound, and when this is the case the storage and shipment of the oil or its household use becomes exceedingly dangerous.

Since the vast increase in the production of rock oil, and its extensive substitution for other oils, camphene, &c., it has become very desirable to have some means of readily testing any particular oil, in order to ascertain whether there is danger or not of its producing explosions.

Accordingly several of the leading coal oil dealers applied to Guiseppe Tagliabue, a thermometer maker of this city, whose instruments, commended by the arctic explorers, Drs. Kane and Hays, have given him a world-wide reputation, and requested him to construct an instrument for the purpose. He accordingly gave his attention to the matter, and produced the neat and effective instrument illustrated in the annexed engravings.

This instrument goes practically and directly to the point desired to be ascertained, and shows the temperature at which any oil produces an explosive mixture, as well as the temperature at which the liquid oil will be ignited by the contact of flame.

Fig. 1 of the engravings is a perspective view of the instrument as prepared for testing the temperature of the oil at the explosion of the vapor. Fig. 3 is a vertical section of the instrument as thus arranged, and Fig. 2 represents it as prepared for measuring the inflaming point of the liquid.

The oil is contained in a cup, A, which is fitted into an outer cup, B, that is partly filled with water, so that the oil may be heated in a water bath. These cups are supported in a brass cylinder, C, which has an opening in one side for the reception of a spirit lamp. The lamp being lighted, the oil is gradually heated, giving off vapor with a rapidity proportioned to its volatility. This vapor is mingled with air entering through the orifices, *d d*, (See Fig. 1,) thus forming an explosive mixture which fills the cylinder, F. By frequently introducing a lighted taper through the opening, *e*, (again see Fig. 1,) in the cylinder, F, during the process of heating, the exact time at which the vapor is rising with sufficient rapidity to form an explosive mixture is ascertained by a slight explosion taking place. The temperature of the oil as indicated by the thermometer is now observed, and thus the very lowest temperature at which the oil will form an explosive mixture under these conditions is positively ascertained.

To determine the temperature at which the oil itself will ignite on contact with the flame, the cover is removed from the cup, A, by turning it partially around as shown in Fig. 2, the bulb of the thermometer still resting in the oil. The oil is now repeatedly tested as it is being heated, by touching a lighted taper to its surface, and when it begins to burn its temperature at the ignition point is observed by the thermometer.

The cover, with its connections, the thermometer and cylinder, F, are made removable together, in order that if they become so heated in the course of an experiment as to disturb the indications, they may be cooled by being plunged in cold water. This feature is deemed of considerable practical importance by the inventor.

Fig. 1

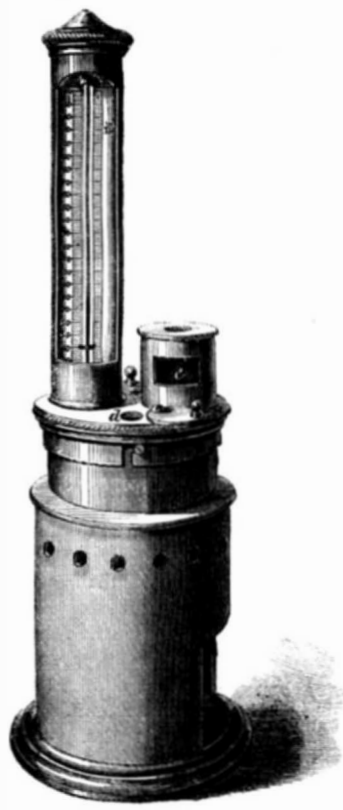


Fig. 2

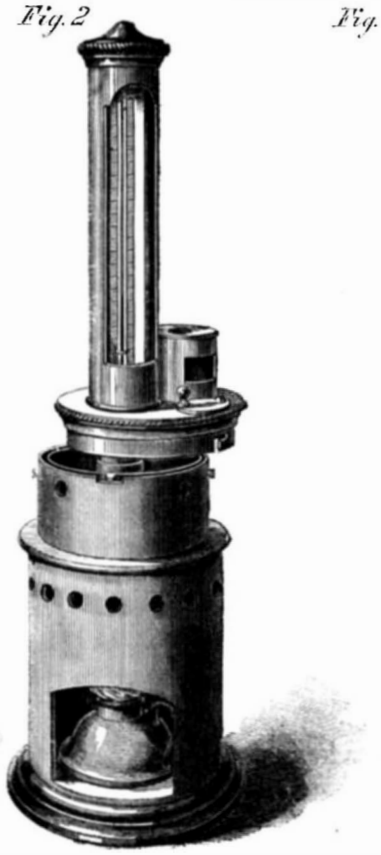
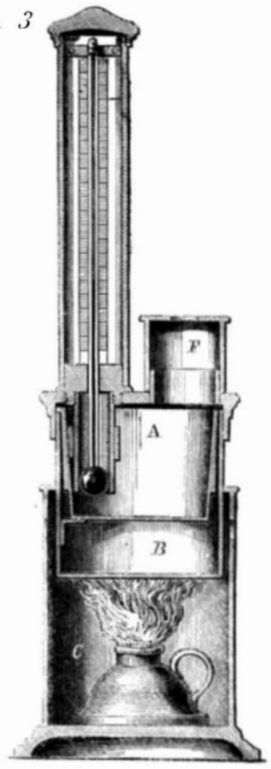


Fig. 3



TAGLIABUE'S COAL OIL PYROMETER.

Further information in relation to this invention may be obtained by addressing the inventor, G. Tagliabue, at 298 Pearl street, New York.

MEUCCI'S KEROSENE LAMP.

If a lamp without a chimney that will burn kerosene oil without smoking is never produced, it will certainly not be from any want of ingenuity among our inventors, but from insurmountable difficulties in the thing itself. The devices which have already been suggested and tried seem to be innumerable, and new ones continue to come forth in endless succession. The lamp which we here illustrate we have tried ourselves, and find that it produces a small flame free from any perceptible smoke.

The improvement consists simply in embracing the wick by two platinum plates, one on each side, the hight of which is made adjustable; that of the wick remaining constant. The plates, *c*, (see the cut,) are soldered to the upper end of a sliding sleeve, *a*, which fits loosely upon the wick tube, *b*, and is moved up and down by means of a rack and pinion.

If the plates are turned down and the wick is lighted smoke will be given off, but by raising the plates the production of smoke is stopped and a clean white flame is produced.

The inventor says that other metals may be employed, though he has found no other so good as platinum. He has also discovered that a plate on one side of the wick only will prevent the formation of smoke.

This improvement was invented by Antonio Meucci, of Clifton, N. Y. It has been assigned to Antonio Jané, to whom the patent was granted Aug. 12, 1862, and for further information in relation to it inquiries may be addressed to Jané & Llanusa, 140 Water street, New York city.

Nitric Acid Stains.

Those who are engaged in chemical operations, either as amateurs or as practitioners, frequently use nitric acid, which stains the skin of the hands a deep yellow, and is so difficult of removal that it usually remains until the epidermis is renewed. M. Schwarz, in the *Repertoire de Chemie*, states that the best way to treat such stains is by an application of the sulphide of ammonium with the addition of a little caustic potash. By this means the coloring matter is not destroyed, but the burnt epidermis is converted into a soapy substance, which can be scratched off with a small piece of wood, the nail, or rubbed off with sand. By washing with a little dilute sulphuric acid, the skin becomes clean and recovers its natural whiteness. M. Schwarz believes that in some cases the above combination might be used as a caustic, and that its application might prove serviceable in certain affections of the skin.

Enormous and Wonderfully Accurate Scales.

Messrs. Sampson & Tibbits, of Green Island, N. Y., recently secured through the Scientific American Patent Agency, a patent on an improved scale for weighing at one draft a canal boat with its cargo, and we find in the *Waterford Sentinel* an account of the trial of the first of these scales constructed at Waterford on the Champlain canal. We quote :—

The canal boat *C. Bristol*, was loaded with pig iron at Fort Edward—the load when weighed on amounting to 188,166 pounds. The scale made it 834 pounds more, with about one-eighth or three-sixteenths of an inch more water in the boat than when her light weight was procured. The boat *W. W. Wright*, cleared at Whitehall last week, with 155,900 pounds of grain carefully weighed on, as reported by her master. The scale gave that weight precisely. The boat *Mountain Maid*, with a cargo of coal, weighed on at Rondout was weighed, the weights agreeing very nearly.

The beam is very sensitive, so much so as to require a nice balance. With a weight of 355,000 pounds on the cradle the removal of two pailfulls of wet oats was readily detected. A fifty pounds sealed weight added to that amount would give immediate motion to the beam, and the weight of a man could be, and was, almost exactly determined.

The scale weighs at one draft any weight between 100 pounds and 450 tuns.

General Kearney was not a West Point graduate. He entered the army as a volunteer in the cavalry.

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NEW YORK, SATURDAY, SEPTEMBER 20, 1862.

PETROLEUM IS NOT COAL OIL.

We observe that the practice is quite common of calling petroleum coal oil, but the appellation is not correct. The oil which is obtained by the distillation of coal is not the same substance as petroleum.

One of the most wonderful facts in nature is the formation of so great a number of substances by the combination, in different proportions and in different ways, of the two elements, hydrogen and carbon.

By the dry distillation of wood a substance is obtained called methyl. It is a colorless gas with a slight odor somewhat resembling that of ether. The atom of this gas is found to be composed of two atoms of carbon, and three of hydrogen, $C_2 H_3$.

In alcohol there is another substance called ethyl, which is also a gas, though it may be reduced to the liquid form by a pressure of 2½ atmospheres. The ethyl atom is formed by the combination of four atoms of carbon with five of hydrogen, $C_4 H_5$.

There are other substances, formed by the combination of hydrogen and carbon, which if arranged in order form a series of wonderfully regular gradations:

1. Methyl $C_2 H_3$
2. Ethyl $C_4 H_5$
3. —— ——
4. Valyl $C_8 H_9$
5. Amyl $C_{10} H_{11}$

and so on, with several blanks yet to be discovered, up to melissyl $C_{60} H_{61}$

Methyl is a gas, ethyl is a gas which may be condensed to a liquid, valyl is a liquid which boils at 108° of the Centigrade thermometer, amyl is a liquid which boils at 155°, and finally melissyl is a solid obtained from beeswax, and only melts at 55°. Thus the simplest members of the group are the most volatile, and as the numbers of the atoms increase the substances become more solid. The specific gravity increases in the same way, and these two laws apply to all the series of the compounds of hydrogen and carbon which have been examined.

It will be observed that by adding $C_2 H_2$ to one member of this group we have the composition of the member next above in the series, and this curious law also applies to other groups of these compounds; but if the commencement is different, all of the substances in any two groups will be different. For instance, there is a series called the formyl group; the simplest substance in the series being a gas called formyl. This gas is composed of two atoms of carbon, and one of hydrogen, $C_2 H$, and by adding $C_2 H_2$ we have the several substances of this group.

Formyl $C_2 H$
Acetyl $C_4 H_3$
Propionyl $C_6 H_5$
Butyryl $C_8 H_7$
Valeryl $C_{10} H_9$

and so on, with only three breaks yet undiscovered, up to Cerotyl $C_{54} H_{53}$ Acetyl is the radical of vinegar, and butyryl of butter. In this group as in the methyl, the simplest substances are the lightest and the most volatile.

If coal is distilled at a high temperature as in making illuminating gas, one series of hydrocarbons is formed; if at a lower temperature, as in making oil, another series is formed. Of those formed in the manufacture of gas, a very full statement by Dr. Hoffman will be found on another page.

That petroleum consists of a mixture of hydrocarbons is well settled, and there is no doubt that these have a wide range in specific gravity and in volatility. But they have never all been separated, and severally examined. There is no doubt, however, that they are different from the coal-tar series. There is no benzole in petroleum, and hence the mauve dyes can not be made from it.

The investigation of the several hydrocarbons contained in coal oil offers a fine field for some of our ambitious chemists, and we wonder that they have neglected it so long.

PAINES'S SPRAY SUPERHEATED STEAM ENGINE.

A steam engine for which steam is generated on a very ingenious principle has been in operation for several days, and is now on exhibition at 21 Center street, this city. The patent has recently been taken through this office, and we will briefly state wherein the invention differs essentially from the ordinary steam engine. For the latter, as every body knows, a boiler is used containing a considerable quantity of water, to which the heat of the furnace is most directly applied, and from which the steam is generated. Such a boiler is a magazine of force, because it contains a far greater amount of steam and heated water than is required to supply the engine at each stroke. Herein consists the danger from explosions in common boilers. A hot-air engine has no magazine of force like a steam boiler. Its heater is supplied with the exact amount of air requisite for each stroke, hence its immunity from explosion. This new engine embraces a similar principle. It has a peculiarly constructed heater into which the exact quantity of water for each stroke is fed in the form of spray, then it flashes into steam and passes over an extended heated surface to the working cylinder.

The engine exhibited is single-acting, and of the following dimensions:—Its steam cylinder is 7 inches in diameter; the stroke of piston, 7 inches. It is situated upon a small tank 30 by 34 inches, which forms the bedplate and the heater of the feed water. The feed pump has a stroke of one-fourth of an inch, and the water is fed through a ¼-inch pipe. The steam heater, outwardly, resembles a vertical cylindrical stove. It is 13 inches in diameter and 30 inches in hight. There are 19 double tubes inside and the steam passes between these and is heated on two sides. The circular grate containing the fire is capable of being adjusted by a lever and set at any required distance from the bottom of the heater. We have examined this engine working with superheated steam at 50-pound pressure, and running at the rate of 87 strokes per minute. The steam exhausts into the tank upon which the engine stands, the feed-water, nearly at the boiling temperature, is conveyed into the heater in a fine shower through a small conical chamber on the top of the heater. A small quantity of superheated steam is contained in the heater and the feed water in the form of spray, is instantly converted by it into saturated steam. The pipe for supplying the cylinder with steam is situated nearly at the bottom of the heater, hence the saturated steam formed from the feed-water at the top of the heater has to pass in a current between the double tubes on its way to the cylinder, and it thus flows over a very extended heating surface and becomes superheated. A constant current of steam is maintained in this manner over the heated surfaces of the tubes. By such a heater and such arrangements of the parts of the engine, nearly all the heat is economized, and a perfectly safe steam engine is secured. If the feed pump were to cease working or the supply of water to become exhausted, the heater would become like an empty oven after a few strokes, and the engine would stop of itself. For pumping water, printing presses, sawing wood and various operations requiring a small moter from 1 to 10-horse power, this engine appears to be well adapted, as it is compact, safe and easily controlled. We shall soon be able to present to our readers an engraving of the invention, and in the meantime we shall examine more thoroughly into its economic qualities—an important point—which we shall then more fully discuss.

MAJOR General Sumner entered the army as a private, and rose through all ranks to the highest.

SALTS OF SILVER, PHOTOGRAPHY AND INDELIBLE INK.

The quality which salts of silver possess of becoming black by exposure to light lies at the very foundation of the photographic art. The chloride of silver is most sensitive to the action of light. It was discovered a long time ago by the old alchemists in their search after the "philosopher's stone," and was by them denominated "horn silver." It is formed from a solution of the nitrate of silver. The latter is made by dissolving metallic silver in aquafortis (nitric acid), then adding a solution of common salt to it. A white precipitate of chloride of silver is formed, which, when exposed to the light for a few moments, changes from white to violet color, and then to black. The blackening of this salt by the rays of light did not escape the attention of the old alchemists, and it led them to the opinion that light as well as heat was one of the great agents in the transmutation of metals. The action of light upon certain salts and substances, whereby they are decomposed and changed in appearance or color, constitute the chemistry of the photographic art. Other salts beside the chloride will also turn black if exposed to the light, provided they are in contact with organic bodies. The action of light upon different substances is not yet well understood. This agent facilitates (in some cases) the combination of certain elementary bodies, and in other cases it hastens the separation of combined elements. The blackening of silver salts by light is an instance of chemical decomposition. In the form of chloride of silver it is a white salt; when it becomes dark by exposure to light the black substance produced is simply metallic silver in a very finely subdivided state. A very simple experiment may be performed to establish this fact. Dip a slip of ivory into a solution of the nitrate of silver until it assumes a bright yellow color, then place it in a tumbler containing rain water and expose it to the direct light of the sun, and it will then gradually become black; but when dried and rubbed with an agate burnisher the ivory surface will become bright and resemble a slip of metallic silver.

Heat produces an effect upon the salts of silver analogous to light. M. Niepce de St. Victor heated a metallic plate by boiling it in water, he then placed the print of an engraving against it, and over that a sheet of paper prepared with the nitrate of silver and the chloride of gold, and he obtained a violet-blue impression on the paper of the dark parts of the engraving. If the paper is only prepared with the nitrate of silver the light parts of the engraving are reproduced in metallic luster.

Long before photography was known or practiced the nitrate of silver was employed to color the human hair, stain marble and mark linen, and it is still employed to a large extent for the first and last-named purposes. The best indelible marking ink is made with nitrate of silver, aqua ammonia, a small quantity of cream of tartar, sugar, gum arabic and the whole colored red with carmine. About one part of the nitrate of silver is dissolved in twelve parts of water, and ammonia poured in slowly until the solution appears free from precipitate. A very small quantity of gum arabic and sugar are required. This ink must be kept in a bottle screened from the rays of light. Although called indelible, this ink is easily removed with the cyanide of potassium, but it withstands the action of washing with soap and water.

Simple photographic paper, for copying pictures and various objects, may be made as follows:—Prepare a solution of nitrate of silver by dissolving an ounce of the nitrate in twelve of water, and adding aqua ammonia gradually until the solution becomes clear. Take a sheet of white paper, soak it in a solution of common salt and then dry it. After this stretch it on a clean board, apply the ammonia nitrate solution to its surface evenly with a sponge, and dry it in the dark.

To copy a print or a negative picture, it is placed with its face upon the sensitive paper, and a plate of glass is placed upon its back, and the whole exposed to sunlight through the glass. The picture gradually appears upon the prepared paper, first in a bluish tinge then black. When fully developed the paper is first washed in soft water, then the picture is fixed by washing in a solution of the sulphite of soda.

Hair is stained black with a solution of the nitrate of silver and ammonia; or what is better, a solution

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of one part of the nitrate dissolved in six of water is first applied with a sponge, then a solution of one ounce of the sulphuret of potassium dissolved in six of water is applied, and the hair then becomes quite black. A little rose water is applied afterward to neutralize the odor of the sulphuret. What an important part the solutions of silver play in the arts! They convert grey hairs into sable locks; and with the sun beam for his pen, the artist can transfer to his tablets the lineaments of youth and age, and the resemblances of insect, leaf, fruit and flower.

A GREAT LAW OF NATURE.

The various objects and substances of the material world are naturally divided into groups and classes. These several classes, however marked the distinction between them in their full development, fade into each other upon their confines by imperceptible gradations.

In comparing an oak tree with a horse we have no difficulty in deciding that one is a vegetable and the other an animal; but there are organisms varying so little from either animals or vegetables that it puzzles the most learned naturalists to determine to which kingdom they belong. The sporules of the yeast plant swim about vigorously in water, simulating the motions of conscious life so closely that every inexperienced observer, without any hesitation, pronounces them to be sentient beings. Even the French and German microscopists, with the great Ehrenberg at their head, still class these sporules in the animal kingdom, though the English and American naturalists regard it as entirely settled that they are simply seeds of the yeast plant. There are numbers of other organisms in regard to the classification of which, either in the animal or vegetable kingdom, a dispute has long been going on among those who have studied most closely their structure and habits.

The several divisions of the animal kingdom also melt into each other by gradual transitions. The broad distinction between fishes and land animals is bridged over by a class of amphibious beings which can live either upon land or in the water; while the whale and the porpoise, though having the form and habits of fishes, are joined by the structure of their lungs and other organs to the family of land animals. There are fishes and squirrels that can fly like birds, and the characteristics of fishes, birds and quadrupeds are all combined in the ornithornycus of Australia. Even the great divisions of males and females are connected by a group of hermaphrodites which possess the characteristics of both sexes.

The same law is found to pervade the vegetable kingdom, and it is encountered upon the boundaries of every department of nature. Chemical combination is a very different thing from mechanical mixture, but to which of these two forms of union a solution of salt in water belongs, the clearest intellect would find it difficult to determine.

Where shall we draw the line between natural philosophy and chemistry? Between botany and geology? Between astronomy and mathematics? In short, all classes and divisions fade by imperceptible gradations into each other.

Rich Monopolists Shirking their Tax.

The gas companies of New York charge so high a price for their gas that the business is enormously profitable. This is proved by the fact that none of the stock of these companies finds its way into market; the owners holding it with miserly care as their most lucrative investment. These great profits are the result of special privileges granted to the companies by legislative enactment—privileges not shared by the rest of the community. Notwithstanding these advantages, these rich monopolists are the very first to set the unpatriotic example of trying to shirk their share of the tax, and to shoulder it off upon people less able to bear it. We see that the gas companies of Philadelphia have pursued a more honorable course, having resolved to pay their tax out of their own profits. We cannot but think that the action of our companies has been without sufficient consideration, and that these wealthy concerns will, on reflection, be most ready to contribute their share of the public burdens.

Since writing the above we see that our gas companies have probably killed the goose that laid their golden eggs by this little extra strain of their greediness. A resolution has been adopted in the Board of Councilmen directing the Counsel of the Corporation to prepare the necessary papers to transfer all the rights and privileges of the New York and Manhattan Gas Light Companies to the city, in consequence of their expressed determination to make an extra charge of fifteen cents for every thousand feet of gas consumed by their customers after the 1st instant.

THE LONDON EXHIBITION—WROUGHT IRON.

England is the most distinguished country in the world for the manufacture of iron, hence its display of that metal at the Great Exhibition is of the most imposing and interesting character. There are several marked varieties of wrought iron, all of which possess the valuable property of welding. At a high degree of temperature wrought iron may be hammered into almost every form and rolled into very thin sheets. It is a very tenacious metal and its power of resistance to being torn asunder is usually called its tensile strength. Suppose the bar were exactly an inch square, and required 23 tuns to break it, it would be said to support a tensile strain of that weight; and in every case the tensile strength is computed for a transverse sectional area of one square inch, so that comparisons with regard to this property may be conveniently made between different varieties of iron.

The character of the broken surface or fracture of wrought iron affords indications as to quality of great practical importance. The fracture may be fibrous, granular, or distinctly crystalline. But much depends on the manner in which fracture is produced. The same bar may present either a fibrous or crystalline fracture, according as it is broken slowly or rapidly. Thus, iron plate made of good fibrous iron will, when shattered by cannon shot at a velocity of from 1,100 to 1,600 feet in a second, present a crystalline fracture. The presence of phosphorus tends to render wrought iron more largely crystalline in fracture; and the presence of carbon within certain small limits induces a granular fracture, which, indeed, is only a particular degree of the crystalline. Problems of the highest practical importance are connected with this subject.

The Lowmoor iron, so universally known, is made in Yorkshire. It is fine grained and much used for railroad purposes. It has a bright and steel-like fracture, and is applied with advantage to objects which are exposed to much wear from friction, such as railway tires and railheads, and certain parts of machinery. Railheads composed of it are not subject to lamination in the same degree as those of fibrous iron.

A great number of specimens of Yorkshire and Staffordshire iron are on exhibition. The latter is not so fine in the grain as the former. The best plates are made of mixed iron, chiefly scrap Swedish, Shropshire and Derbyshire refined iron. There is one armor plate which bears the following inscription:—"This armor plate, 21 feet 3 inches long, 6 feet 3 inches wide, 5½ inches thick, having a superficial area of 133 feet, weighing upward of 13 tuns, was forged at the Mersey Steel and Iron Works, Liverpool, and has been neither smithed nor tooled since it left the steam hammer. This plate would have been made 15 feet to 20 feet longer if space could have been obtained."

The Butterley Company have sent two armor plates, each 14 feet long, 5 feet wide, and 4½ inches thick, and weighing when finished six tuns.

John Brown & Co., of Sheffield, exhibit two armor plates, whose dimensions are as follows:—No. 1, length 21 feet 8 inches, width 4 feet 2 inches, thickness 6½ inches, weight 10 tuns, 12 cwt.; No. 2, length 24 feet, width 3 feet 8 inches, thickness 5 inches, weight 7 tuns 17 cwt. A few years ago the rolling of such enormous masses of iron would have seemed incredible. Several large plates, only two inches in thickness, for gunboats, are also exhibited.

The display of bars, rails, and girders is magnificent. There are gigantic rails exceeding 100 feet in length, but these are to be regarded as curiosities and interesting as exhibitions of power and effective mechanical appliances, showing what might be done if required. The Butterley Company have sent a rail 117 feet long and 5¼ inches deep, and a tension bar for girders 83 feet long, 1 foot wide, and 1 inch thick.

The Dowlais Company exhibit two rails of the following dimensions:—one 53 feet 6 inches long, 4¾ inches across the head, and 10 inches deep, the other 31 feet 6 inches long, 5½ inches across the head, and 15 inches deep.

Belgium makes a very creditable show of rails and rail sections, and it is declared that in certain foreign markets she has beaten the English producer both with respect to quality and price. The Austrian Society of State Railways exhibit specimens of rails—some with the head of granular and the foot of fibrous iron, and others of puddled steel. This is a great manufacturing company, established with the view of producing everything required for the use of railways.

There is a railway solid wrought-iron wheel, stamped by ingenious mechanism, invented by M. Arbel, a Frenchman. It is forged under the steam hammer, and combines strength and cheapness.

The Monkbridge Company exhibit railway iron tires faced with steel welded upon them. The iron tire in bar being heated to whiteness, and dusted over with borax powder, the melted steel is cast round it and it is then hammered. The union of the iron and steel seems to be perfect. This improvement was introduced into England from France. There are also wrought iron unwelded tires exhibited by the Blenavon Company, which are the invention of M. M. Petin and Gaudet, also of France. Rolled beams and girders of great size were introduced but lately from Belgium and France into England. In the perfection of several processes and in the use of more powerful mechanism for working iron, the French and Germans have been in advance of the English iron workers. This will be news to many of our readers, but it is a fact. H. Krupp, of Essen, intends to erect a set of rolls so large that he will be able to roll out a boiler plate of such a size as to form an entire boiler for an engine of considerable power. When this is effected it will certainly be a triumph of mechanical enterprise.

Wealth of Great Britain.

A writer in the *Edinburgh Review* estimates the property of Great Britain and Ireland in 1858:—

Real Estate	£3,200,000,000
Personal Property	2,775,000,000
Total	£5,975,000,000

Which is in round numbers twenty-nine thousand millions of dollars. This is just about $1,000 to each inhabitant.

By the last census returns the wealth of the United States was estimated at sixteen thousand millions of dollars—about $500 to each inhabitant.

The tax for the support of the British Government amounts to a little more than one per cent of the whole wealth of the kingdom. This is in addition to city and other local taxes, the church tithes, poor rates, &c. The public debt is four thousand millions of dollars—about 14 per cent of the wealth of the nation.

More Big Guns.

The Pittsburgh *Chronicle* states that the Fort Pitt works in Pittsburgh, are turning out the immense fifteen inch guns now at the rate of three a week. These guns weigh each in the rough about 70,000 pounds, and apart from the difficulty of casting, the labor of handling, turning and finishing such a mass of metal must be immense. There are four of these guns now in the lathes, and by the time these are out others will be ready to take their place. It is the intention to turn out three a week, we believe, for the balance of the year. These guns are intended for the new *Monitors*, and are the most formidable of their character in the world. Arrangements are now in progress for casting a twenty-inch gun. This latter gun will throw a ball of one thousand pounds, and is expected to have a range of four miles.

AERATED BREAD IN CALIFORNIA.—A large bakery has been commenced in San Francisco, for manufacturing bread charged with carbonic gas, instead of being fermented. A steam engine supplies the power needed for mixing the dough (which is never touched with the hand), and forcing the gas into it. The time required for the whole process, from the putting in of the flour till the bread comes from the oven, is less than an hour, and the capacity of the machinery is sufficient to turn sixty barrels of flour into bread in a day.

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Explosion of a Boiler and its Cause.

On Saturday, the 6th inst., a steam boiler exploded at the factory of I. M. Singer & Co., Delancey street, this city, by which three men who were employed on the premises lost their lives. A coroner's inquest has been held on the bodies of the victims, and a decision rendered to the effect that the deceased came to their deaths by injuries received by the explosion, and that "the jury believe that the engineer and the fireman of the factory are censurable for the explosion; the fireman for starting the fires after he had been informed of the state of the boiler, and the engineer for not making a thorough examination of the boiler and its connections after being notified of the trouble."

To understand the nature of this decision and the charge against the engineer, William Ford, and the fireman, Michael Reagan, it is necessary to give the substance of some of the evidence before the jury:—The private watchman of the establishment stated that he had examined the four boilers in the factory on the evening before, and found that no water would flow out of some of the gage cocks, although there was a high pressure of steam on. He then went for a boiler maker named McGiven, with whom he was acquainted, and both of them tried to raise one safety valve with their hands and were unable to do so. It pressed against the rafters so firmly that they could only slightly raise it with a piece of timber placed under the ball. He informed the fireman of this next morning, and also the engineer. The fires were started before sufficient water had been let into the boilers, and the pumps did not seem to operate well.

William M. Storm, a mechanical engineer for the Police Department, stated that three of the four boilers in the establishment were uninjured, and upon examining their safety valves he could lift three easily, but the safety valve of the one which exploded was fast; the lower gage cock was also immovable. The four boilers were in a gang—all alike and set side by side. Their connections were such that they could work all together or in pairs. They have return flues 14 inches in diameter, and both flues of the one that exploded were collapsed from end to end and torn away at their junction with the ends of the boiler. Joseph E. Coffee, engineer and boiler inspector for the Metropolitan district, stated that he had examined the exploded boiler and that the safety valve had been shut at the time of the explosion. All the four boilers had their feed water pipes open, but two of them had their steam pipes, which led to the engine, closed, and only one of these exploded—the one which had its safety valve fast. There had been fire under all the four boilers. The steam which was generated in the two boilers that were disconnected with the engine, forced the water out of them, as the pressure increased, into the other two boilers, thus nearly emptying the two former boilers. "The flues of these then became overheated and one gave way with an ordinary pressure of steam." This was the cause of the explosion, in the opinion of Mr. Coffee, and it is very evident that it is a clear explanation of it. Mr. Coffee also stated that had the boiler been full of water and the safety valve in proper order the explosion would not have taken place. It was the duty of the engineer to see that the connections were in proper order. Mr. B. G. Lord, sergeant of the sanitary police, stated that the engineer who had charge of these boilers, had no certificate from the Police Department.

Nine-tenths of all the explosions which take place are the results of similar causes.

The Genius of Our People.

Notwithstanding a vast number of the loyal inventors of our land are in the ranks of our army, the lengthy list of claims published weekly in these columns, indicates that the "inventors are not all dead," or all gone to the war. Although the patent office bureau has suffered considerably in the diminution of its business, and ourselves proportionately to the patent office, there have been over one hundred and forty applications for patents made through this office per month, on an average, since the year 1862 was inaugurated. Up to the first of September our books show that eleven hundred and eighty-nine patents have been solicited through the Scientific American Patent Agency, during the past eight months.

How Engineers in the Navy are Appointed.

In answer to many inquiries that have been made to us of late from parties who desire situations as Engineers in the naval service, we give the following as the system adopted by the Navy Department previous to the breaking out of the rebellion. We are not advised that any changes have since been made, although the exigencies of the service have been very pressing.

Before persons can be appointed Assistant Engineers in the navy, they must have passed a satisfactory examination before a board of at least three engineers, designated at such times as the wants of the service require. Application for permission to appear before such board must be made in writing to the Secretary of the Navy, accompanied by satisfactory testimonials as to good moral character, correct habits and sound constitution. The application will be registered, and when a board next meets permission will be sent to the applicant, stating the time and place of the board.

In the examination of a Third Assistant Engineer, the candidate must be able to describe all the different parts of ordinary condensing and non-condensing engines, and explain their uses and their mechanical operation; to explain the manner of putting engines in operation, how to regulate and modify their action, and the manner of guarding against danger from the boilers, by the means usually applied to them for that purpose. He will be expected to write a fair, legible hand, and to be well acquainted with arithmetic and the mensuration of surfaces and solids of the regular forms; to have worked not less than one year in a marine engine manufactory, and present testimonials of his mechanical ability from the director of the establishment in which he may have served. He must not be less than twenty, nor more than twenty-six years of age.

Candidates for promotion to the rank of Second Assistant Engineer must have served at least two years as Third Assistants in the management of steam engines in the navy in actual service; must produce testimonials of good conduct from the Commanders and Senior Engineers of the vessels in which they have served; and must pass a satisfactory examination upon the subjects and to the extent prescribed for Third Assistants; they must likewise be able to explain the peculiarities of the different kinds of valves, the construction of expansive valves, the manner of their operation, the remedies which are usually resorted to to check foaming in boilers; must possess a knowledge of the usual causes of derangement in the operation of air pumps, force pumps and feed pipes; the proper preventatives and remedies, and the mode of cleaning boilers when required. They must have a general knowledge of the mensuration of surfaces and solids.

Before promotion to the rank of First Assistant Engineer, candidates must have been employed at least three years as Second Assistant Engineers in the management of steam engines in actual service, and produce testimonials of character and good conduct from their former commanders and superior engineers; must pass a satisfactory examination upon the subjects prescribed for Third and Second Assistants, the mechanical powers, the general principles of the operation of steam engines, the causes of, and the best means of removing, the different kinds of deposits and incrustations to which boilers are exposed, and be able to furnish a working sketch or drawing of different parts of engines and boilers; to superintend their construction, and determine upon their accuracy and fitness for use.

Promotions to the grade of Chief Engineer are to be made after the candidates have served for two years as First Assistant Engineers in the management of steam engines in the navy in sea service, and have been examined upon any of the subjects specified for Assistants, which the board may deem expedient; and after they shall have satisfied the board of their previous good conduct and character, of their sufficient knowledge of mechanics and natural philosophy; of the forms, arrangements and principles of different kinds of steam engines, boilers, propellers, and their various dependencies, which have been successfully applied to steam vessels, and their alleged relative advantages for sea or river service, and shall have attained twenty-six years of age.

The Assistants must employ all favorable opportunities for acquiring a practical knowledge of the fabrication of the different parts of steam engines and their dependencies, that they may be able to repair and replace such parts as the space and means for making and repairing can be furnished in steam vessels. When other qualifications are equal, candidates whose skill and abilities in these particulars are superior will have precedence over others, for admission or promotion, who may be considered equal in other particulars.

The engineering corps are paid as follows:—Chief Engineers, $2,600; First Assistants, $1,250; Second Assistants, $1,000; Third Assistants, $750 per annum. When off duty the pay is reduced.

THE FRIGATE IRONSIDES.

This vessel recently went on her trial trip to Fortress Monroe, and after being absent from Philadelphia for about three weeks, she has returned. Some of our Philadelphia cotemporaries speak of her performances in flattering language, and yet there are some circumstances connected with her which require explanation, before those who are capable of judging are satisfied of her success. Her spars were previously secured in position, then they were taken out before she made her trip, and now, it is stated, she is to be hauled on the central pier at the Navy Yard, her spars to be put in at once, and some alteration made in her steerage apparatus. It is stated that she made ten miles an hour on her trip, which had it been perfectly successful, she would not, we think, have been brought back to Philadelphia for alterations, when her services are required in Hampton Roads.

THE NORTH IS INVADED.

Let every man who sincerely loves his country in this the hour of her greatest peril, reason with his soul earnestly what he ought to do in this great crisis. In the language of the noble Patrick Henry "is life so dear and peace so sweet, that they must be purchased at the price of liberty? Forbid it Almighty God!" This war has now assumed such magnitude that there is no knowing where it may stop, and unless we spring to arms with new resolution our Government will be overthrown, and the last hope of free institutions perish forever. The crisis is imminent and pressing, and all should push forward to the front who are able to bear arms.

Wholesale Prices of Domestic Goods in New York.

Shirtings, Brown	₰ yard.	— 18	@— 22
Shirtings, Bleached, 26 @ 32		— 16	@— 17
Shirtings, Bleached, 30 @ 34		— 18	@— 22
Sheetings, Brown, 36 @ 37		— 22	@— 25
Sheetings, Brown, 39		— 23	@— 25
Sheetings, Bleached, 34		— 18	@— 22
Sheetings, Bleached, 36		— 18	@— 22
Calicoes, Fancy		— 15	@— 22
Brown Drillings, 27 @ 30		— 25	@— —
Bleached Drillings, 30		— 23	@— —
Kentucky Jeans		— —	@— 18½
Cloth, all wool		1 60	@ 3 —
Cloths, Cotton warp		— 70	@— 80
Cassimeres		1 25	@ 1 37½
Sheep's Grays		— 65	@— 75
Satinets		— 50	@— 75
Flannels		— 25	@— 35
Canton Flannels, Brown		— 23	@— 25
Canton Flannels, Bleached		— 22	@— 25
Cottton Osnaburgs		— 20	@— 24
Printing Cloth, 44 by 48		— —	@— 8½

The prices of cotton goods are still on the rise.

San Francisco.—The census of 1860 gave the city 60,000 inhabitants, and a census has been taken yearly since, each of which illustrates its progress still more remarkably. In 1861 the population was 83,000, and in 1862 it is 90,000. Its progress since the breaking out of the gold fever has been as follows:—

1850	20,000
1852	34,876
1860	60,000
1861	83,000
1862	90,000

Fishing by Steam.—A novel experiment is to be tried by a steam fishing vessel lately fitted up at Leith. Her trawling gear, which is very heavy, is to be wound up by a capstan driven by steam power, and all living fish thus taken will be put into a well, or salt water aquarium, having a constant circulation of water through it, and thus the fish will be kept in existence until brought to market. This is said to be the first direct application of the steam engine to the purpose of catching fish.

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RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list :—

Harness Saddle.—This invention consists in constructing the saddle of two wooden bearings connected at their upper ends by a metal spring which is strengthened or supported by an elastic piece of wood, and having the upper surfaces of the wooden bearings grooved in such a manner as to receive the covering of the saddle. The object of the invention is to obtain a harness saddle which will adapt itself to the back of the animal, and fit snugly or properly thereon, without injuring the back of the horse in the least ; and at the same time admit of being manufactured at a comparatively low price, and form a superior piece of work for first-class harnesses. Robert Spencer, of Brooklyn, N. Y., is the inventor.

Car Coupling.—This invention relates to an improvement in the ordinary car coupling now in general use and which consists simply of a socket formed at the end of the draw bar and provided with a vertical pin which secures the link or shackle within it, the link or shackle forming the connection between the drawheads of two adjoining cars. This coupling, although possessing some disadvantages, has, on account of its simplicity, the small cost with which it may be constructed, and not being liable to get out of repair or become deranged by use, not been superseded by any of the more pretentious couplings hitherto devised. In many of the latter, advantages have been obtained not possessed by the old coupling, but, at the same time, they all have thus far proved to have some objectionable or impracticable feature which has served to prevent their general adoption. This invention consists in a very simple modification of the old coupling by which the link or shackle may be adjusted in the drawheads of two adjoining cars when the former are in contact, the shackle not requiring to be adjusted longitudinally in the drawheads by hand, as hitherto, when the cars are in motion. To effect this result the drawheads, or rather their sockets, are furnished with a slot extending around both sides in such a manner that the shackle may be inserted laterally in the sockets as well as longitudinally. The invention further consists in a simple means for perventing the casual detachment of the pins from the drawheads, whereby the usual chains are dispensed with. A. I. Ambler, of Milwaukee, Wis., is the inventor of this device.

Device for Letting off Water from Pumps.—The object of this invention is to provide simple and effective means for letting off water from pumps to prevent freezing. It consists in the arrangement of a screw rod provided at its lower end with a valve or stopper of cork or other suitable material, and passing down through a suitable case on the side of the pump stock in combination with a pipe emanating from the lower parts of the pump stock and communicating with the interior of the same, in such a manner that by means of said screw rod the pipe can be opened and closed at pleasure, and that when the pipe is open the water remaining in the pump is permitted to ooze out, and the freezing of the same prevented. Caleb G. Puckett, of Cerro Gordo, Ind., is the inventor.

Submarine Carriage for Hauling up and Launching Vessels.—This invention consists in constructing the carriage with a joint in such a manner that it may be shoved along on the bed of the river a greater or less distance beyond the lower end of the ways, so as to enable vessels to be floated over and upon the carriage and touch at a point near the upper end of the latter. The object of the invention is to avoid the difficulty hitherto attending the hauling up of vessels of heavy draught in shallow places or where there is not a sufficient depth of water to enable a vessel to be floated properly upon the carriage, and also to avoid the difficulty attending the launching of vessels in shallow water. A. O. Crane, of Hoboken, N. J., is the inventor of this device.

VALUABLE ARMS.—One of the English vessels recently captured while trying to run the blockade, and brought to this city, had a number of rifles on board, and on examining them they were found to have no vents!

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING SEPTEMBER 2, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

36,328.—John Agate, of Cuba, N. Y., for Improved Machine for Holding and Filling Bags :

I claim the bag holder and filler, constructed and arranged, substantially in the manner specified.

36,329.—Francis Alger, of Boston, Mass., for Improvement in Fuzes for Explosive Shells :

I claim, first, The construction and arrangement of a sliding time fuze, within the fuze case, so that the shell will be exploded by striking, substantially in the manner described.

Second, I claim the elastic packing ring, h, applied and operating substantially as described.

Third, I claim the washer, g, applied and operating substantially as described.

Fourth, I claim the arrangement of a hammer, fulminate and time fuze, substantially in the manner and for the purposes specified.

36,330.—W. H. Babcock, of Homer, N. Y., for Improvement in Water Elevators :

I claim the arrangement of the spring, K, projection, J, piece, U V, and pawl, E e, for operation with the loose crank and ratchet wheel, and frictional surface, P, substantially in the manner herein set forth.

36,331.—A. C. Baker and John Van Dyne, of Hyde Park, N. Y., for Improvement in Car Couplings :

I claim the yielding jaws, B B, with the transverse bars, D D, attached ; in combination with the shackle, J, and levers, E E, the latter being placed on the shaft, F, which is provided with the arms, G G, connected by the crossbar, H ; the above parts being used with or without the guides, I I, and fitted in or applied to the drawhead, A, as and for the purpose set forth.

[The object of this invention is to obtain a car coupling which will be self-engaging or connecting, and admit of being readily disconnected by the foot of the operator or brakeman, on the platform of either of the two cars which the coupling connects ; the parts being so arranged that the shackle of the coupling will always be retained in a horizontal position, or nearly so, in the drawhead, so as to insure as two cars approach each other, its entrance into the drawhead of the car which is not provided with the shackle.]

36,332.—I. F. Baker, of West Yarmouth, Mass., for Improvement in Invalid Bedsteads :

I claim, first, The arrangement of the rollers, C C′, sheet, I, ratchets, D and D′, and the interchangable bearings, b b′, operating together, substantially in the manner and for the purpose herein described.

Second, I also claim the double pawls, F f, so arranged as to be self-supporting, substantially as and for the pur pose herein set forth.

36,333.—A. W. Brinkerhoff, of Upper Sandusky, Ohio, for Improved Device for Husking Corn :

I claim the herein described corn husker, composed of a clasp, H, and a hooking tooth, B, whether formed entire of one piece of metal or by combining the hooking tooth with a metallic, leather or other clasp or band, by any of the common modes of attachment, such as riveting and soldering, as and for the purposes set forth.

36,334.—A. W. Brinkerhoff and A. T. Barnes, of Upper Sandusky, Ohio, for Improvement in Fruit Gatherers :

We claim, first, In fruit gatherers the use of the metallic cap or upper jaw, C, with blade, B, and stop, S, substantially as and for the purposes described.

Second, In combination with the cap or upper ja w, C, blade, B, and stop, S, we claim the arrangement of handle, H, low er jaw, A, adjustable, actuating wires, W, and conductor, P, substantially as and for the purposes set forth.

36,335.—A. W. Brinkerhoff, of Upper Sandusky, Ohio, for Improvement in Corn Planters :

I claim, first, So constructing the main framework of corn-planting machines as that an additional framework, combining the seeding devices, shoes, attendant's seat and elevating lever may be placed and carried thereon, substantially as described and for the purposes set forth.

Second, I claim so combining with the main framework of corn-planting machines, an additional framework containing the seeding devices, shoes and attendant's seat—all of which are forward of the center of the wheels or ground supports—the whole supported and carried on the main framework, and so that said additional or upper framework may be either added or removed to or from the main framework without in the least degree disarranging any of their parts, substantially as and for the purposes set forth.

Third, I claim so constructing corn-planting machines as that the shoes or furrow openers, shall, at all times when relieved of the weight of the attendant, and without manipulation, be raised above the ground by the weighted lever, m, and there carried, as and for the purposes set forth.

Fourth, I claim so constructing corn-planting machines as that the weight of the attendant who operates the seeding mechanism, is necessary to, and will force the additional framework to which the shoes are attached, down upon the main framework, thereby causing them to penetrate the earth to a certain and uniform depth at all times, producing uniformity in the depth of planting, which may be varied as desired by notched slide, h, as set forth.

Fifth, I claim so constructing corn-planting machines as that the attendant or person who operates the seeding mechanism, may, by placing his feet upon the lower or main framework, and gradually rising, relieve the additional or upper framework of his weight, thereby allowing the shoes to rise above the ground for the purpose of turning at the ends of the fields, and passing over intervening obstacles, without the assistance of a second attendant, or the necessity of dismounting, as set forth.

Sixth, I claim, in combination with corn-planting machines supported mainly upon not less than two wheels and slightly upon the horses' necks, and with its seeding devices forward of the center of the wheels, and which are elevated automatically, a hinged or yielding joint in the rear of all points of support, as described and for the purposes set forth.

Seventh, I claim in seed-planting machines the automatic elevation of the shoes or furrow openers above the ground, for the purpose of passing intervening obstacles, turning around and transporting the machine from place to place, as set forth.

Eighth, I claim in combination with a corn-planting machine, wherein that portion of the framework containing the seeding devices is elevated automatically, and having its seeding devices forward of the center of the wheels, so connecting the parts between the main and additional framework, as that by simply removing the bolts at c c, Figs. 1 and 4, the additional framework may be removed, having the main framework perfect for marking the ground preparatory to planting, as set forth.

Ninth, I claim the weighted lever, m, or its equivalent, in combination with the additional framework, as and for the purposes set forth.

Tenth, I claim the weight, K, on lever, m, adjustable when used in combination with seed-planting machines, for the purpose of accommodating it to the amount of seed in the boxes, and varying weights of attendants, as set forth.

Eleventh, I claim in combination with corn-planting machines, the metallic plates, T T, constructed as described, forming a receptacle for the neck of shoe, S′, the bearing for the shaft of cylinder, 4, and a ready and firm attachment for seed boxes, 30 30, as set forth.

Twelfth, I claim, in combination with corn-planting machines, the hounds, f f, when constructed as described, thereby saving all necessity for wood and bolts in their manufacture.

Thirteenth, I claim the combination and arrangement of cylinder, 4, with metallic base, 6 6, and metallic cap, 3 3, elastic cut off, 10 10, and dish or hopper, 21, as and for the purposes set forth.

Fourteenth, I claim providing the face of cylinders of seed planters with oblique grooves, in combination with seed cells, substantially as described and for the purposes set forth.

Fifteenth, I claim the formation by seed-planting machines, of the double furrows, w w, Fig. 10, with the continuous scatterer, x, between them, as described, and for the purposes set forth.

Sixteenth, I claim the inverted v-shaped opening in the lower front part of shoe, S′, or its equivalent, for the purpose of forming the double furrows and continuous scatterer, and to prevent the shoes from becoming clogged, as set forth.

36,336.—A. W. Brinkerhoff and A. J. Failor, of Upper Sandusky, Ohio, for Improvement in Field Rollers :

We claim applying directly to the centers of field rollers, as nearly as we possibly can, a single projection, cast in sections but forming one continuous marker when applied to the roller, and attached or held in place by screws or bolts, whereby they may be easily applied to the roller for marking corn ground, and as easily removed therefrom, leaving the roller in proper form for use on meadows or for preparing other ground when smooth surface is desired, substantially as and for the purpose set forth.

36,337.—C. M. Bromwich, of South Boston, Mass., for Draught Attachment for Lamp Boxes :

I claim the box, B, provided with an elevated chamber, C, in combination with a box, D, perforated at its upper and lower part, as shown at d c, and having a suspended box or deflector, E, within it, all arranged as shown, and used with or without the box, A, as and for the purpose herein set forth.

[This invention relates to an improved arrangement for admitting of the escape of air from the lamp box and the admission of the external air therein, whereby the supply of air to the flame of the lamp is rendered uniform or constant and the flame allowed to burn without any flickering.]

36,338.—Hiram Burlew, of Lock Haven, Pa., for Improved Composition for Concrete Pavements :

I claim the employment or use of a composition for paving, made of the ingredients herein specified, and mixed together in the manner and in about the proportion described.

[This invention consists in a composition of pine tar, gravel, sand, coal ashes and calcined plaster, mixed together so as to produce a compound which is free from smell, and which becomes, in a short time, perfectly hard and weather and water proof.]

36,339.—G. F. J. Colburn, of Newark, N. J., for Improvement in Applying Reflectors to Lamps :

I claim the mode herein described of applying reflectors to lamps, for the purpose specified.

36,340.—A. O. Crane, of Hoboken, N. J., for Improvement in Sub-Marine Carriages :

I claim a carriage or cradle for sub-marine railways, constructed of two or more parts, connected by hinges or joints, to operate as and for the purposes herein set forth.

36,341.—Joseph Defossez, of Paris, France, for Improvement in Safety Lamps :

I claim the pneumatic locking device, m n o, in combination with the oil reservoir, A, top plate, F, and chimney, D, all constructed and operating substantially in the manner and for the purpose herein shown and described.

[This invention relates to certain improvements in that class of lamps known as Davy's Safety Lamps, and it consists in the application to the cover of the lamp, of a peculiar locking device, in such a manner that neither the cover nor the wire-gauze protector can be removed, until, by the application of an air pump or other suitable means, the bolt of the locking device is withdrawn.]

36,342.—John DuBois, of Williamsport, Pa., for Improvement in Dams :

I claim, first, In a dam shoot which is operated by hydrostatic pressure beneath an apron, a divided apron having its parts hinged at the point of junction, substantially as and for the purpose described.

Second, In a dam shoot having a divided apron, I claim a fixed articulating joint at one extremity of the apron, in combination with a sliding joint at the opposite extremity of the apron, for the purpose set forth.

Third, I claim a dam shoot having an apron made in sections, H H′, hinged together at their junction as at i, the lower section, H′, articulating upon a fixed hinge, and the upper end of the section, H, traveling in a horizontal slot at the bottom of the flume, the whole being operated substantially in the manner and for the purpose described.

36,343.—J. B. Easlam, of Bridgeport, Conn., for Improvement in Settees for Railroad Passenger Cars :

I claim suspending the seat thereof from the same pivots upon which the back swings, and so connecting the arms of the seat and back with each other, that any desired inclination may be given to the former by the mere raising and lowering of the latter, substantially as described.

36,344.—B. W. Fay, of Boston, Mass., for Improvement in Sweats for Hats :

I claim the sweat herein described, prepared with an ornamental seam, g g, and secured to the hat in the manner substantially as set forth.

36,345.—William Grange, of Augusta, Ky., for Improvement in Harrows :

I claim the peculiar arrangement of the arms, c and c′, outer rotating frame, A′, and roller, E, in connection with the inner rotating frame, B′, and roller, F, the two rotating frames being carried by and rotating concentrically in opposite directions upon the same central stem, C, as set forth.

36,346.—William Gregg, of Philadelphia, Pa., for Improved Refrigerator :

I claim combining a water cooler with a refrigerator so that the latter, in connection with its ice box, shall form the cover of the water cooler, the whole being arranged together so as to operate in the manner described for the purposes specified.

36,347.—T. F. Griffiths, of Dansville, N. Y., for Improved Holdbacks for Carriages :

I claim the employment or use of the clasp, C, and the hook, B, they being constructed substantially in the manner specified, and operating conjointly for the purposes set forth.

36,348.—William Grover, of Holyoke, Mass., for Improved Gas Regulator :

I claim the combination with the oscillating pipe, D, and its fulcrums, j j, of the inverted cup, E, and its arms, k k, in the manner herein shown and described.

I also claim the arrangement of the fulcrums, j j, within the mercury cup, h, as herein shown and described.

[This invention consists in combining the inlet and outlet chambers of a gas regulator by means of an oscillating siphon-shaped pipe, so applied as to form a means of communication through which the gas passes from one chamber to the other, and so combined with an inverted cup, and with basins of mercury, as to constitute the regulating valve.]

36,349.—Jasper Hazen, of Albany, N. Y., for Improvement in Beehives :

I claim the combination of the parts, A A, boxes, B B B and C C, adjustable bottom board, D, and bars, G G, in one hive as specified.

36,350.—J. M. Hendricks, of Philadelphia, Pa., for Improvement in Hulling Machines :

I claim, first, The two plates, D D′, provided with teeth, as shown, one, D′, being arranged to rotate on an adjustable shaft, E, and the other, D, fitted permanently in the case, C, with an elastic or yielding substance, formed of india rubber and cork, interposed between it and the side or plate, a, of the case, as and for the purpose specified.

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Second, In combination with the plates, D D′, the blast fan, N, and reciprocating screen, O, placed within the box or case, M, and arranged in relation with the plates, D D′, to operate as and for the purpose herein set forth.

Third, The polisher or scourer formed by the rotating-toothed shaft, O′, placed within the box, N′, in combination with the screen, O, blast fan, N, and plates, D D′, arranged as and for the purpose specified.

Fourth, The rotating screens, Q T, placed one within the other in the case, R, in combination with the polisher, O′, reciprocating screen, O, blast fan, N, hulling plates, D D′, the latter being placed within the case, C, and the plate, D′, provided with the conical flanched feeder, F, projecting within the hopper, B, and all arranged to operate as and for the purpose specified.

[The object of this invention is to obtain a machine of simple construction which will hull and cleanse from all impurities, coffee, cotton seed and various kinds of grain, and also grind coffee and grain with the greatest facility, and perform the work expeditiously and in a thorough and perfect manner.]

36,351.—Joseph Hollen, of Fostoria, Pa., for Improvement in Knitting Machines :

I claim, first, The stitch-lifting levers, H H H, arranged around the end of the cam cylinder, g, so as to operate in combination with the needles, C, and presser, E, substantially in the manner described for the purpose specified.

Second, Giving to the needle cylinder, B, the periodic motions described by means of the forked plate, M, or its equivalent, operated by the cam cylinder, g, and spring, N, substantially in the manner described for the purposes specified.

36,352.—Alexander Irwin, of Pittsburgh, Pa., for Improvement in Engines for City Railroads :

I claim, first, The oscillating engines, F F, in a frame, E, suspended underneath the car bed, A, as shown, in combination with the heater, K, tanks, H H, and boilers, G G, all arranged and disposed in relation with the car bed, A, to operate as and for the purpose herein set forth.

Second, Constructing the tanks, H, with a series of compartments in connection with the valves, J, and rods, I, arranged therein as shown for the purpose specified.

Third, The sprinklers or jet discharges formed of the tubes, L, with perforated pipes, m, at their lower ends, when said tubes are connected and arranged with the tanks, H, and the wheels, B, for the purpose herein set forth.

[The object of this invention is to obtain a simple and compact steam car for street or city railroads, one in which the engines and driving mechanism will be so arranged or disposed as to cause each wheel to be subjected to an equal weight and not at all interfere with the room or space designed for passengers.]

36,353.—I. R. Lawrence, of Green Island, N. Y., for Improvement in Endless-Chain Horse Powers :

I claim the movable half circle or outside guide or guides, G, for the endless chain at the end of the machine, the machine being so constructed, substantially as herein described, that a lag, B, link, C, or roller, D, can be taken from and replaced in the endless chain at the circular end of the machine on removing the said half circle or outer guide or guides, G, without taking either the guard rail or guard rails, I, or the horse or horses from the machine.

I also claim the inclined tapered axles, L, cast on links, C, combined together and with the rollers, D, lags, B, and tracks, E F, substantially as herein described.

And I also claim the inclined tapered pivots, N, and corresponding sockets, P, cast in and upon links, C, combined together and with lags, B, rollers, D, and supporting rail, E F, substantially as herein described.

36,354.—A. S. Lyman, of New York City, for Improved Apparatus for Concentrating Milk :

I claim the combination of the rotating disks, g g, the continuous pan, B, and the air passage, c, substantially as and for the purpose herein specified.

36,355.—Alexander Moffitt, of Brownsville, Pa., for Improvement in Hubs for Vehicles :

I claim, first, The box, a, in combination with the part, b, and parts, c d e, with their appendages or flanges, substantially as described.

Second, The pins, p and q, with their fastening screws, p′ and q′, in combination with the holes in the lips of the cup-shaped flanges, d′ and f′, as described.

Third, The screw nut, d, and flange, d′, for tightening the disk, c, and flange, c″, upon the ends of the spokes.

Fourth, The screw nut, f, with its flange, f′, and imperforate diaphragm, h, constructed in the manner and for the purposes specified.

Fifth, The semi-eliptical or semi-oval mortise, c′ and e′, constructed in the manner and for the purposes set forth.

36,356.—Prosper Monnet, of Lyons, France, for Improvement in Producing Aniline Colors :

I claim the within-described process of treating the hydrochlorates or other salts of aniline or toluidine with nitro-benzine, substantially in the manner and for the purposes specified.

[By this process a beautiful red, blue and purple color is produced. Messrs. Schneider & Heidlauff, of No. 21 South William street, New York city, are Mr. Monnet's agents in this country.]

36,357.—Prosper Monnet, of Lyons, France, for Improvement in the Manufacture of Aniline Colors :

I claim the within-described process of treating the red of aniline with methyline or wood spirit and nitric acid substantially in the manner and for the purpose set forth.

[By this processa beautiful violet-blue color of aniline is produced.]

36,358.—James Nichols, of Limestone, N. Y., for Improvement in Magazine Firearms :

I claim, first, The powder charger, Q, applied in combination with the rotating cylinder, C, and a magazine, P, substantially as herein specified.

Second, The bullet-feeding mechanism consisting of the plunger, S, double ratchet rod, S′, slide, T, dog, T′, link, 14, and lever, U, the whole combined and applied to the firearm in combination with the magazine, R, to operate substantially as herein specified.

Third, The frame, A B, attached rigidly to the stock and the frame, E F G H, attached to the barrel fitted together and combined by means of a yoke, G, and cam, I applied and operated substantially as herein described, to produce a longitudinal movement of the barrel or stock, the one relatively to the other.

Fourth, Combining the cylinder with the recoil shield by means of the zig-zag groove, h h i i, in the cylinder and the pin, j, in the recoil shield, such groove and pin serving both to stop the cylinder in its revolution and to detach the cylinder from the barrel in the longitudinal movement of the latter, substantially as herein specified.

Fifth, The elbow lever, N, carrying the revolving dog, n, and the cam, I, applied in combination with each other and with the cam, L, by which the longitudinal movement of the barrel is produced substantially as and for the purpose herein specified.

[This invention mainly consists in certain means applied to a firearm in combination with a rotating many-chambered cylinder, for the purpose of permitting and effecting the loading of the chambers with loose powder and bullets or shot from magazines attached to the barrel or forestock of the arm in front of the cylinder.]

36,359.—Robert Porter, of Philadelphia, Pa., for Improved Sheet-Metal Cans for Oils, Varnish, &c. :

I claim providing a sheet-metal can with drain grooves, d d, in its top plate, A, the said grooves leading directly from the periphery of the latter to its cork tube, B, and the said plate being slightly raised toward its said tube, substantially as described and set forth and for the purposes specified.

36,360.—J. C. Osgood, of Troy, N. Y., for Improvement in Submarine Excavators :

I claim, first, An endless bucket or elevator dredging machine which is arranged to swing wholly upon a crane and operated thereupon, and is capable of being raised and lowered upon said crane, substantially as and for the purposes set forth.

Second, The combination with adjustable inclined ways, D, and the frame of the crane, B, of the device, o y, or its equivalent, substantially as and for the purposes set forth.

Third, So combining the bevel wheels, M N, and main upright of the crane with the shaft and pinion, L, through which the power is transmitted from the engine to the machinery in the crane, that said crane may be made to articulate in any desired direction without affecting or varying the working relation of said bevel wheels with the said shaft and pinion, substantially as described.

Fourth, The construction and arrangement of the crane, substantially as specified, so that the endless chain of buckets or elevators shall stand and discharge at a point higher than any other part of the apparatus, for the purpose set fortn.

Fifth, In combination with the endless chain of buckets the manner of hanging the shute or trough so that it will adjust itself by means of the bolt under the hopper and the small crane, H, substantially as herein set forth.

Sixth, The manner of constructing the hopper with the reversing bottom in combination with the shute or trough for the purpose set forth.

36,361.—A. T. Peck, of Scott, N. Y., for the Improvement in Butter Tubs :

I claim, as an improved article of manufacture, a butter tub, firkin or box, constructed of wood and having a lining of mica, substantially as described.

[This invention consists in constructing a wooden butter tub or firkin, with a lining of mica, whereby many advantages are obtained on the ordinary wooden tubs or firkins now in general use.]

36,362.—N. W. Peebles, of Brunswick, Ohio, for Improved Clothes-Wringing Machine :

I claim the single spring, S, acting directly on the journals of the pressure roller, B, constructed and arranged in combination with the frame, A, and pressure roller, B, substantially as and for the purpose herein specified.

36,363.—David and John Pfouts, of Holmes County, Ohio, for Improved Pricking Martingale for Preventing Horses and Mules from Throwing or Breaking Fences :

We claim the combination of said pricking breast strap and the straps, E E, which hold the pricking breast strap to its place.

36,364.—John Oesterling, of Wheeling, Va., for Improvement in Snap Dragon :

I claim the diagonal slits as shown in Figures 1, 4, 5 and 6 of the drawings or the equivalents of said slits.

36,365.—C. G. Puckett, of Cerro Gordo, Ind., for Improvements in Drain Valves for Pumps :

I claim the combination of the box, f, screw valve rod, c, valve, b, and pipe, a, with the pump stock, A, in the manner herein shown and described.

36,366.—S. S. Putnam, of Dorchester, Mass., for Improved Curtain Fixture :

I claim the loose pivot, f, held in place upon the curtain rod by means of the flange, i, and cap, H, and controlled in its motions by the concealed spring, g, and pawl, k, the pawl engaging directly with the pivot or with a tooth attached thereto, substantially as set forth.

36,367.—F. J. Rebbeck and E. M. Davies, of Pittsburgh, Pa., for Improvement in Lamp Burners :

We claim the wick tube, D, provided with a hollow perforated cylinder, I, and encompassed by a case, K, having one or more openings, d, made in it and provided with a flanch, L, to receive the case or deflector, M, and draught chimney, N, when said parts are arranged to admit of the vertical sliding of either the wick tube or case so as to expose the upper end of the wick tube when necessary for the purpose of lighting or trimming the wick, and also to inclose fully the wick tube when the burner is in use, substantially as herein set forth.

[The object of this invention is to obtain a lamp burner, for burning coal oil and similar fluid hydrocarbons, which will admit of the wick being lighted and also trimmed when necessary without removing the glass draught chimney or detaching any of the parts of the burner.]

36,368.—Moses Reed, of St. Louis, Mo., for Improved Composition for Cleaning Painted Wood Work, Stone, &c. :

I claim the employment or use of a composition made of the ingredients above specified, mixed together in the manner and about in the proportions herein described.

[This invention consists in a compound made by mixing together pulverize pumicestone, sal soda and borax, for the purpose of cleansing painted work or stone work, to be used instead of soap and scrubbing brush.[

36,369.—Benjamin Rice, of Hastings, N. Y., for Improvement in Attaching Thills to Axles :

I claim the employment of the oblong eye, B, in combination with the steel head, a, loose box, E, spring, F, and pin, C, in the manner herein shown and described.

[This invention consists in having an eye of oblong elliptical form made at the end of the thill iron, and having a steel bearing therein, and also a loose box having a spring bearing against it to compensate for wear. The above parts being used in connection with a steel connecting pin and Babbett-metal bearing fitted in the yielding box, whereby a very strong and durable coupling is obtained, and one in which wear is fully compensated for. An engraving of this invention appeared on page 168 of the current volume of the Scientific American.]

36,370.—L. D. Roberts, of Cleveland, Ohio, for Improvement in Machines for Making Horseshoes :

I claim, first, The combination of the eccentric, C, mandrel, D, the primary and secondary arms, L L″, when operating conjointly in the manner and for the purpose set forth.

Second, I claim the cam lever, N, rods, o o, and spring, M, in combination with the roller, P, and arms, L L″, in the manner and for the purpose specified.

Third, I claim the arrangement of the cams, F F′, arms, I and I′, in combination with the bar, H, arm, J, and rockshaft, K, and arms, L L″, substantially as and for the purpose set forth.

Fourth, I claim the jaws, U U, springs, V V, gages, S S′, and mandrel, D, on the eccentric, C, when arranged to operate conjointly in the manner and for the purpose specified.

Fifth, I claim the adjustable gages, S S′, with the movable slide, l, and adjustable clamps, n n, operating conjointly with the mandrel, D, and jaws, U U, as and for the purpose herein described.

Sixth, I claim the cam, G, lever, g, and spring, j, in combination with the shears or cutter, T, operating in the manner and for the purpose set forth.

36,371.—J. W. Schreiber, of New York City, for Improvement in Coal Oil Lanterns :

I claim the lamp, A, provided with a cylindrical rim or case, D, and a polygonal or corrugated flanch, F, in combination with the chimney, and the shirt or jacket, K, on or around the upper part of the latter, all arranged as and for the purpose herein set forth.

[This invention consists in constructing the body or fountain of the lamp with an external rim or case of cylindrical form, and also with a polygonal or corrugated flanch of such diameter that it may fit within the external rim or case of the lamp, between it and the body or fountain, and form circuitous air inductive passages through which the flame is supplied with air. These parts being used in connection with a draught chimney provider at its upper part with a jacket or skirt, all arranged in such a manner as to form a convenient and economical lantern for burning coal oil with a brilliant light.]

36,372.—Charles Seymour, of Laporte, Ind., for Improvement in Machines for Upsetting and Stretching Tires :

I claim, first, The frame, B, sliding bed plate, c, with its rack, D, sector, E, the stationary jaw, J, and adjustable jaw, K, when arranged to operate in combination with the eccentrics, G G G G, the said parts operating together in the manner and for the purpose set forth.

Second, I also claim in combination with frame, B, sliding bed plate, C, rack, D, and sector, E, the punch stock, H, punch l, die stand, F, and die, N, when the several parts are arranged in the manner and for the purpose specified.

36,373.—Edward Shore, of Conshohocken, Pa., for Improvement in Knitting Machines :

I claim driving the stripper wheel of a rotary knitting machine, and if desired the landing and loop wheels by means of gearing from the main shaft of the machine, substantially as herein set forth for the purpose specified.

36,374.—A. J. Simpson and J. B. Currier, of Lowell, Mass., of Improvement in Lamp Burners :

We claim the flanch, G, having the cylinder, F, attached, the latter being fitted on the cone or deflector, D, as shown, so that it may turn freely thereon, and at the same time be prevented from being casually detached, in combination with the two openings, g h, made respectively in the cone and cylinder, all arranged as and for the purpose specified.

We further claim providing the flanch, G, with two curved slots, e e, and lips, c c, substantially as shown for securing the chimney to the flanch, and at the same time admit of the expansion of the chimney under the heat of the flame, as set forth.

[This invention relates to an improved lamp burner of that class in which provision is made for lighting the wick without removing the chimney from the burner; the device is a simple and efficient one for the puppose.]

36,375.—W. E. Smith, of Port Washington, Wis., for Improvement in Apparatus for Cleaning Wells :

I claim the box, A, attached to the extension shaft, E, and provided with the shovel or scraper, F, spur, I, and gate B, all combined and arranged to form a new and useful article or device, for the purpose specified.

[The object of this invention is to obtain a simple and efficient device by which wells may be thoroughly cleaned without persons descending into them, and thereby avoid much hard and disagreeable labor, and accidents which frequently occur in consequence of inhaling the poisonous gases within the wells.]

36,376.—Robert Spencer, of Brooklyn, N. Y., for Improved Harness Saddle :

I claim the combination with the bearings, A A, when constructed of wood, and covered with felt or other fabric, so as to do away with the usual method of stuffing, of the elastic metallic plate, B, and the elastic strip, C, or either of them, in the manner and for the purpose substantially as herein shown and described.

36,377.—Charles H. Waters, of Groton, Mass., for Improvement in Looms for Weaving Wire Cloth :

First, I claim the drawing-off of a shoot of filling wire, while the shuttle is in its box, substantially as described.

Second, I claim the holding of the shoot of filling wire, after it has been drawn from the bobbin, until it is drawn or thrown into the open shed of the warp by the shuttle, substantially as described.

Third, I claim the use of the fly shuttle, in throwing a shoot of filling wire after it has been drawn and held, substantially as described.

36,378.—Seth Wheeler, of Albany, N. Y., for Improvement in Links for Horsepowers :

I claim the supporting link, E, or its equivalent, applied to the studs or journals, C C′, for the purpose of distributing the weight or strain on both sides of the wheels, D D′, substantially as and for the purpose specified.

36,379.—S. A. Wheelock, of Charlton, Mass., for Improvement in Churns :

I claim the above described mode of operating churns when constructed and operated in the manner and for the purposes as above set forth and described.

36,380.—Joseph White and Angus Agnew, of Philadelphia, Pa., for Improvement in Coal Oil Lamps :

We claim the spreader, having in its top, a, an elongated opening and inclined or curved strips extending from the ends of the said opening to the upper edge of the wick tube, the whole being applied to the wick tube or cap of a coal oil lamp, as set forth for the purpose specified.

36,381.—W. H. Willard, of Cleveland, Ohio, for Improvement in Boots :

I claim one or more pockets constructed and arranged as described, in combination with the boot, for the purpose specified.

36,382.—A. I. Ambler (assignor to himself, R. N. Ambler and W. Martin), of Milwaukie, Wis., for Improvement in Car Coupling :

I claim, first, Providing the draw bars, A, with sockets, b, extending entirely through them from side to side, to admit of the lateral insertion of the link or shackle, C, as and for the purpose herein set forth.

Second, The keys, d, fitted in the lower parts of the pin, E, in combination with the slots, e, and recesses, f, in the draw bars, as and for the purpose specified.

Third, The securing of the links or shackles, C, in the draw bars, A A, by means of the links, D, and bolts, C, when used in connection with the sockets, b, extending entirely through the draw bars from side to side, as set forth.

Fourth, Adjusting the draw bars, A, vertically at their outer ends to suit cars or platforms of different hights by means of eccentrics, cranks or their equivalents, placed on shafts, and having the draw bars resting on them, and operating or turned by means of cranks or gearing, as set forth.

Fifth, The combination of the sockets, b, links or shackles, C, and pins, E, all arranged in connection with the draw bars, A, as and for the purpose set forth.

36,383.—P. S. Boothby (assignor to J. W. Brooks and Warren Soule), of Biddeford, Maine, for Improved Fastening for Gaiter Boots :

I claim the clasp, B, with its connecting link, C, or its equivalent; to be used in connection with the cords, D and E, loop, G, and cord or raised edge, F F, constructed and arranged in the manner and for the purpose as specified.

36,384.—G. W. Lockwood (assignor to Horace Carpenter and Company), of New York City, for Improvement in Skeleton Skirts :

I claim the arrangement of the cords, C and D, relatively to each other and to the hoops, substantially as and so as to produce the effect above described.

36,385.—Franz Vester, of Pforzheim, Grand Duchy of Baden, assignor to Charles Wagner, of New York City, for Improved Device for Protecting the Soles of Boots and Shoes :

I claim the employment of the thin hardened plates or washers with rivets connecting them with the soles of boots and shoes, substantially in the manner and for the purpose set forth.

36,386.—C. W. Cahoon, of Portland, Maine, for Improvement in Lamps :

I claim the combination of the lamp head and handle, substantially as set forth.

I also claim the combination of the lamp head, handle and vibratable chimney holder, fitted with chimney fastenings, substantially as set forth.

I also claim the combination of the U-spring, chimney, fastening and tongue, substantially as set forth.

I also claim the combination of a corrugated air screen and deflector, substantially as set forth.

REISSUES.

1,337.—M. Easterbrook, J. M. Wood and E. A. Brownson (assignees of said Easterbrook and Wood), of Geneva, N. Y., for Improvement in Machines for Peeling Willows. Letters Patent No. 34,201, dated January 21, 1862 :

First, We claim the employment or use in willow peeling machines, of two presser wheels, D and F, constructed and operating substantially as described, so as to produce a direct central pressure upon three sides of the passing willow.

Second, The projections, m, attached to yielding slides, i, which are fitted in a plate, L, between the bars, K, and arranged in relation with the wheels, D and F, to operate as and for the purpose specified.

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Third, Also the combination of the presser wheels D and F, yielding scrapers, m, revolving brushes, M, and the discharging rollers, N arranged as and for the purposes specified.

1,338.—Henry Jenkins, of Brooklyn, formerly of Pottsville, Pa., for Improvement in Wire Fences. Letters Patent No. 6,106, dated February 13, 1849:

I claim, first, An iron fence or other article formed by the combination of woven wires and rods, with grooved bars surrounding the same and receiving the ends of the wires, in the manner specified and for the purposes set forth.

Second, I claim forming the surrounding metallic frame of a woven wrought iron panel, by the employment of two bars attached to each other, and having between them the ends of the wires or rods forming the wrought iron work, substantially as specified.

Third, I claim crimping straight wires or rods in opposite directions at the required distances apart, and weaving said wires or rods together to form meshes as set forth, whereby the general straight form of the wire is maintained except at the points where the wires cross, as specified.

Fourth, I claim crimping wires or rods at different or irregular distances along their lengths, in order that said wires or rods, when woven together, shall form open iron work with meshes of different shapes, substantially as set forth.

Fifth, I claim wires or rods crimped in opposite directions, and formed with bends between the crimps at right angles to them, and woven together as specified, whereby the crimps set into each other at the points of intersection, and the aforesaid bends regulate the shape of the meshes, as set forth.

Sixth, In combination with the iron work formed by wires or rods crimped and woven together, as set forth, I claim the rods twisted together, as specified.

1,339.—J. M. Allen, of Fredericktown, Ohio, assignee of Newman Silverthorn, of Prescott, Wis., for Improved Boot and Shoe Tip. Letters Patent No. 26,329, dated November 29, 1859:

First, I claim a tip as an article of manufacture formed into shape, in such a manner as to allow of its being applied and fastened to the toe part of the shoes or boots, by sewing or pegging it between the upper and the sole, substantially as herein before described and for the purposes set forth.

Second, A shoe or boot tip as an independent device and marketable commodity, formed of a material different from, and that will present greater durability and resistance to wear than that of which the shoe or boot to which it is intended to be applied is made, such tip being made of such permanent form as to lap over and under the toe part of the upper, and whereby it may be attached to the boot or shoe by securing it at its base between the sole and upper, and without sewing it to the upper; substantially as herein described.

Third, The production as an article of manufacture of a shoe or boot tip, made of such india rubber or gutta percha compound, as that when vulcanized it shall be of a more or less soft, flexible and elastic nature, or of any other material that will render it applicable to boots or shoes by sewing it in between the upper and the sole, substantially as herein set forth.

Fourth, The production as an article of manufacture of a shoe or boot tip, made of such india rubber or gutta percha compound, as that when vulcanized it shall be of a more or less hard or rigid nature, or of any other material that will render it applicable to boots or shoes by pegging it in between the upper and the sole, substantially as herein set forth.

DESIGN.

1,654.—W. L. Washburn, of Springfield, Mass., for Design for a Burial Case.

Out of the sixty-two patents reported above (the issue of a single week), TWENTY-TWO of the number were solicited through the Scientific American Patent Agency.

BLACKWOOD'S MAGAZINE. Published by Leonard Scott & Co., Gold street, New York City.

The last number of this able periodical contains the "Chronicles of Carlingford" continued, and a most able essay by Bulwer "On the Moral Effects of Writers." Several other articles are very interestnig, especially a review of the ten years' rule of Louis Napoleon.

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 3,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

J. K., of Ind.—You can unite water and oil permanently by heating the mixture and adding a little soda or other alkali. This will combine with the oil to form soap, which will be dissolved in the water.

J. W. H., of Iowa.—The small piece of grit which you have sent us, is a mixture of clay and a little silica colored yellow with the oxide of iron.

D. B. J., of Ohio.—We have no reliable information in regard to the air engine which is said to be in progress in Russia. Ordinary inventions made abroad are often much magnified in their passage across the ocean.

H. C., of Mass.—White iron is supposed to contain less carbon than any other pig iron. It is unfit for casting, as it is sometimes so thick when melted, as to be incapable of running into molds. It is very brittle, but while it may be very easily broken by the blow of a sledge hammer, it is so hard that it can with difficulty be cut with a cold chisel. Its fracture is silvery white, shining, and smooth in its texture. When the color of pig iron is a uniform grey it is a sign that the metal is tough, if it has also a high metallic luster.

J. R., of Ohio.—Your description of your machine that actually flies will appear next week

E. N., of Mass.—Wood does not rot when immersed in water, nor, with the exception of occasional dry rot, when kept in the dry air. Neither does it decay when kept at a temperature below the freezing point of water, but in moist warm air its decay is most rapid, and this seems to have been the situation of your timbers.

S. G. A., of N. F.—There is no city in America supplied by water through pipes where the pressure of the water is applied to drive wheels, and operate cranes on docks to load and unload vessels. Small turbine wheels may be built to be applied for such purposes by several of our millwrights. In Newcastle, England, water power is employed to operate cranes through hydraulic piston engines. Any city like St. Johns, N. F., which has such a pressure of water in the pipes, as 240 pounds on the square inch, may have manufactories driven as well as vessels loaded and discharged by hydraulic power. We are not acquainted with any machinist who will build engines similar to those used in Newcastle.

J. D., of C. W.—Machines were used for cutting grain by the ancient Gauls before the Christian era. A rotary grain reaper was tried in England in 1779, and one in Scotland in 1806 by Mr. Gladstone, of Castle Douglas. In 1815, the Highland Society of Scotland awarded Mr. Smith, of Deanstown, a prize of fifty guineas for the successful exhibition of a rotary mowing machine, which was found very effective in cutting the grass on smooth lawns. It was drawn by two horses, and cut an acre of grass, on one occasion, in one hour. A patent was granted in 1805 to Samuel Adams for the first American reaping machine. You will find an illustrated history of reapers in Vol. X. (old series, 1854,) SCIENTIFIC AMERICAN.

W. H., of L. I.—Your account of the manufacture of menhaden oil is crowded out this week but will appear in our next number. These descriptions of the mode of conducting any manufactures or other operations are always acceptable.

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, Sept. 3, to Wednesday, Sept. 10. Persons having remitted money to this office will please to examine this list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

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Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from September 3 to Wednesday, September 10, 1862:—

I. R. P., of N. Y.; T. F. R., of N. Y. (2 cases); T. H., of N. Y.; W. F., of R. I.; H. A. H., of N. Y.; W. & F., of W. T. (2 cases); F. G., of Mich.; P. J. B., of Pa.; J. W. G., of Mass.; A. Y., of Ohio; C. P., of Conn.; G. D. H., of Ill.; J. M. D., of N. Y.; G. T., of Mass.; N. R., of N. Y.; H. S. R., of N. Y.; H. & D., of Iowa; J. B., of Ind.

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RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issue since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
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RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y.—The thirty-ninth Annual Session of this Institution for instruction in the Mathematical, Physical and Natural Sciences, will commence on Wednesday, Sept. 17, 1862. Appropriate quarters, and a full supply of apparatus, will be provided, so that all the Courses of Instruction can be given precisely as heretofore. The new buildings for the Institute will be placed on a more commanding site, and be constructed as soon as possible.
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IMPORTANT TO INVENTORS.

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The annexed letters from former Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

MESSRS. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly, CHAS MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster General of the United States, he addressed to us the subjoined very grateful testimonial:—

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Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.—*Gentlemen:* It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your Agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, WM. D. BISHOP.

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Bank Note Splitting.

An English paper, *Keene's Bath Journal*, has the following :—

Mr. Thomas Millard, a native of Bath, now one of the Queen's book binders, under the librarian at Windsor Castle, has discovered a method of splitting bank notes or any other sheets of paper. By the courtesy of Mr. Gregory, of Bath street, with whom Millard served his time as an apprentice, specimens of the young man's ingenuity, consisting of a £5 Bank of England note, a sheet of the *Times*, of the *Illustrated London News*, of the *Bath Journal*, and of the *Daily Telegraph*, each of which has been split cleanly and cleverly into two parts, without any rent or tear, have been exhibited to many of our fellow citizens during the past week. There can be no mistake about the matter, as we have now before us a copy of a leaf of our own *Journal* completely split in two. The separate parts could well be printed on at the back, but the separation of the flimsey paper of the *Telegraph* seems equally complete. The engravings in the illustrated journal are brought out more clearly by the process, and when mounted on cardboard present a strikingly improved appearance. The discovery is applied by Mr. Millard to practical use in print, mounting, and in repairing torn leaves of books, which he can so skillfully manage that the junction of the new and old paper can with difficulty be distinguished. The mounting of old prints upon paper is also so complete, that the specimens we have seen seem impressed upon the original paper. Unscrupulous people would certainly turn this plan of bank-note splitting to profitable account, if they could find it out, inasmuch as the halves could be made as stiff as the whole, the blank parts could be printed in imitation of the original, and the water mark would of course be perfect. A cotemporary says that "Mr. Millard has devised a method of manufacturing paper that cannot be split, and bankers will probably soon be compelled to make use of his invention;" but this we understand is a mistake. Mr. Millard, to prevent the difficulty which might arise to the Bank of England for having their water mark left on blank pieces of paper, upon which might be printed *fac similes* of their notes, suggests a plan for the prevention of the fraud. We are glad to hear that her Majesty, in consideration of the talent displayed by Mr. Millard in this discovery, has already been pleased to order that he should have an increased salary. We hope his discovery may further lead to his pecuniary advantages.

Phosphorus for Mice.

The extinction of these destructive animals in the open field is practiced as follows in Germany :—Four ounces of phosphorus are fused under water, while two pounds of flour are being made into eight pounds of paste. This is stirred up gradually with the fused phosphorus, making an intimate mixture through which the phosphorus is minutely divided, and this is mixed by hand with sixteen pounds of grain, and then covered with flour in portions at the time, giving the grain a candied appearance.

From eight to ten of these grains are placed into the holes in the field, and this produces the desired effect within twenty-four hours. At a trial of this remedy, in a field covered with 1,666 mouse holes, they were first all carefully closed, but in the following day one half of them was again open. The required quantity of phosphorised grain was then placed in each hole, and the holes closed again. On the following day only forty-five were found open.

SMITHS' MODE OF SETTING TOMBSTONES.

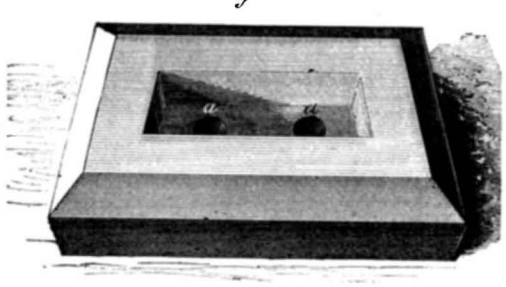
In setting tombstones at the heads of graves it is common, in order to secure them in an upright position, to form a tennon upon the lower end which is inserted in a mortise in a larger stone buried in the earth. To make a perfectly tight joint, careful workmen generally pour sulphur into the mortise to fill any spaces around the sides or edges of the tennon, but this practice is objectionable as the sulphur frequently discolors the stone about the mouths of the channels, and the stones are liable to be still further defaced in efforts to remove the discoloration.

A far neater process which has been recently invented is illustrated in the annexed engraving. This consists in drilling holes from the bottom of the mortise through to the lower side of the base stone or pedestal, and then after the tennon of the tablet is inserted, inverting the stones and pouring the sulphur into the holes. By this process all traces of the sulphur about the mouths of the holes are completely hidden from sight when the stones are reinverted and the pedestal is placed in the ground.

In order that the sulphur may be sure to flow along the sides of the mortise, channels are cut in both sides of the tennon, extending in the form of an inverted U, from one hole to the other. In order to show clearly the mode of forming these channels, *b b*, our cut represents the tablet, Fig. 1, apart from the pedestal, Fig. 2, while the pedestal is turned partly over to exhibit the holes, *a a*, from the bottom of the mortise downward through the stone.

Fig. 1

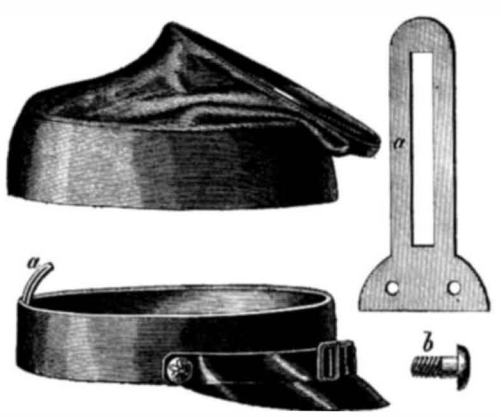
Fig. 2



The patent for this invention was granted, through the Scientific American Patent Agency, July 22, 1862, to the inventors, J. H. and G. W. Smith who have assigned it to J. H. Smith, and further information in relation to it may be obtained by addressing the assignee, at Port Chester, N. Y.

BLYTHE'S VENTILATING CAP.

Among the practices which generally prevail in the community there is probably no one more injurious than the wearing of a close and hot covering for the head, and we are always glad to see any efforts for mitigating the evils of this practice.



The annexed cut represents a ventilating cap, invented by J. O. Blythe, of Philadelphia, which may be drawn open to admit of a free circulation of air in hot weather, and may be readily closed for protection against the rain. It is formed of two parts which are represented as completely separated, but they are to be sewed together at the front and joined by a sliding clasp at the back. This clasp is formed of two parts, a thin metal plate, *a*, with a long slot in it to be fastened to the lower part of the cap, and a large-headed screw or rivet, *b*, to pass through the slot in *a*, and be secured in the upper part of the cap. This allows the upper part to be raised so as to open a slit in the back and around the sides, and in case of rain the upper part may be readily drawn down so as to close the opening.

If it should be deemed preferable the upper part may be fastened to the lower wholly by sliding clasps, without any sewing ; in this case three clasps will be required, one at the back and one on each side toward the front.

Further information in relation to this cap improvement may be obtained by addressing H. Coulter, 56 and 58 South Second street, Philadelphia, Pa.

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FROM THE STEAM PRESS OF JOHN A GRAY

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